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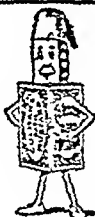
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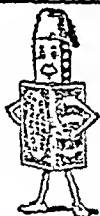
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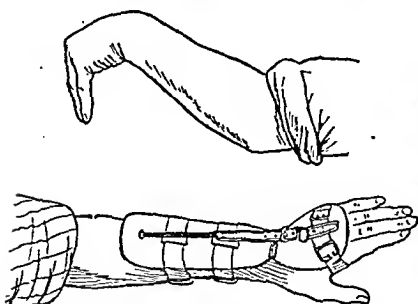
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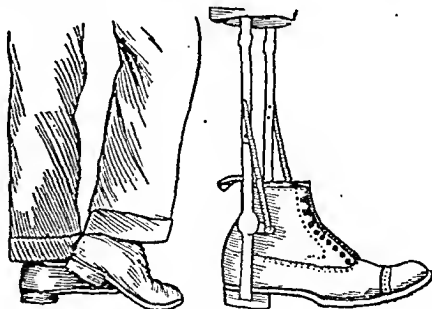
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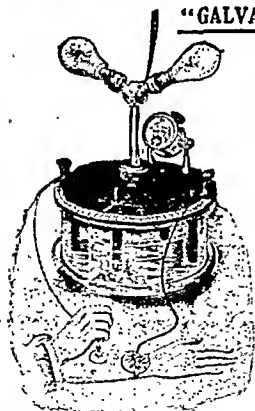
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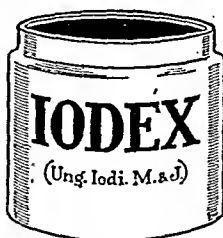
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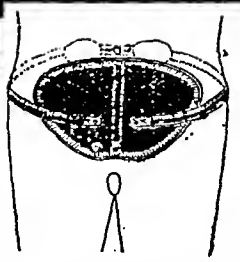
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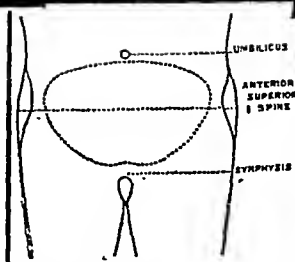
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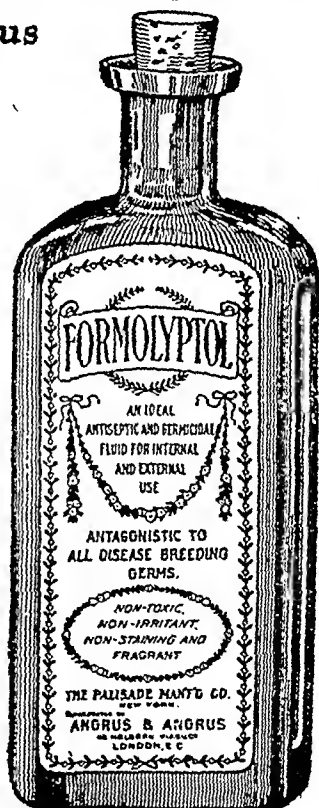
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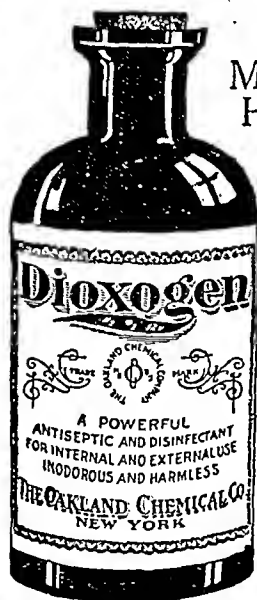
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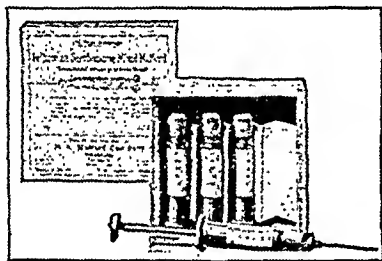
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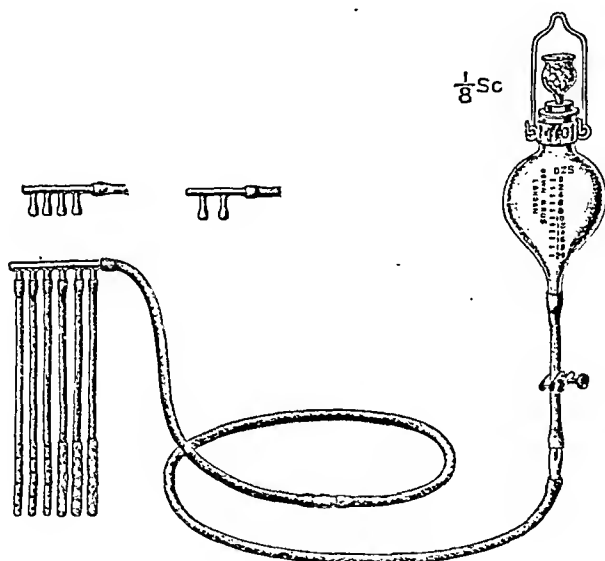
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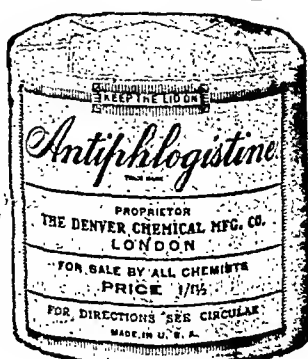
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HOEFFTCKE'S EXTENSION APPLIANCES.

AMBULATORY TREATMENT OF FRACTURE OF THE LIMBS; TUBERCULOUS AND ARTHRITIC DISEASE OF JOINTS.

By C. A. HOEFFTCKE, 21, Woodstock Street, Oxford Street, London, W.

J. A—, male, æt. 55. Loading wood on board ship, crane swung round and set of timber fell on to tibia and fibula below knee, multiple comminuted fracture, 24 pieces, condyles of tibia and fibula involved (May 15th, 1916).

Patient removed to Guy's Hospital on ambulance, leg X rayed (see Fig. 1), prepared for anæsthetic, and following day taken to operating theatre. The limb was then one and a half inches short. Owing to this shortening and in consequence of the contracted soft tissues the leg was much enlarged at and below the knee-joint.

The senior surgeon, when seeing the X ray negative, decided not to plate the bones, but to order Hoefftcke's Extension appliance for this case. I saw the patient some days after, and on May 22nd took a cast of the limb, which was necessary to make my Extension splint.

The patient was then anæsthetised and the shortening reduced on my Extension table, the fragments falling nicely into line with a little manipulation. I then put the limb in plaster and maintained extension. Two weeks and two days later, June 8th, the plaster was cut off and Hoefftcke's Extension splint substituted. Patient stood up and walked a few paces along the ward the same day.

On June 12th the patient walked out in the hall, and on June 14th he was discharged from hospital as an out-patient. On June 16th a little movement in the knee was allowed.

From that time onwards the limb became stronger and more movement in the knee was obtained until, eight weeks after the splint was put on, the patient was allowed to leave the Extension appliance off at night. On Sept. 8th, 1916, the X rays (see Fig. 2) showed firm bony union, there was free movement with full flexion and extension of the knee-joint and no shortening. The splint was then left off for good.

This case shows clearly that the best result can be obtained in the shortest time with the ambulatory treatment in even the most hopeless case of fracture with the joint involved.

My Extension splint is now also extensively used for compound fractures produced by shot or shell, and the surgeons are very satisfied with the result obtained by its use. The upright position of the body and exercise of the joints whilst walking with a broken leg on my Extension splint improve the circulation, which combats sepsis and furthers the formation of callus.



Fig. 1.

May 15, 1916.

Multiple comminuted Fracture,
24 pieces.



Fig. 2.

September 8, 1916.

Fracture firmly united,
Full free movement in knee-joint.

THE PRACTITIONER.

JANUARY, 1917.

"TWILIGHT SLEEP."

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(a) BY SIR HALLIDAY CROOM, M.D., F.R.C.P., F.R.S.E.

Professor of Midwifery, Edinburgh University; Consulting Gynæcologist to the Edinburgh Royal Infirmary; Physician, Royal Maternity Hospital, Edinburgh.

So much literature has assembled round the use of scopolamine-morphine in midwifery, not only in the medical journals, but, unfortunately, in the lay press as well, that it seems to me that the record of personal experience is now the main desideratum. In this communication I gladly comply with the request of the Controlling Editor of THE PRACTITIONER to relate, as shortly as may be, my own experience of it.

I have used scopolamine-morphine narcosis in labour for eight years. The first of my series of cases was published in the *Journal of Obstetrics and Gynæcology*, 1909. One of my residents, Dr. Ruthven Lawrence, afterwards published a series of cases under my care during my term in the Maternity Hospital.

So far as my personal experience is concerned, I have adopted this method in almost every private case that I have attended during these years. The bulk of my work is amongst primiparæ, and here I wish to say that with them it is peculiarly successful, especially with nervous primiparæ, whether young or old. I very seldom employ it with multiparæ, unless in special cases, and with these it has not been so uniformly successful, because of the comparative

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morphine in childbirth are mainly two

First, the loss of memory. In all cases in which an extended and fair trial has been made of these drugs, and when the cases have been properly conducted, I have found, like many others, that the woman seldom retains any memory of labour and its sufferings.

One cannot help realizing that, in the present state of our civilization, and in our modern conditions of life, child-bearing has ceased largely to be a physiological process, and probably the sufferings of women have considerably increased. So much is this the case, that the dread of the pain of childbirth has become an actual menace to the birth-rate. The abolition of the memory of the event has a very material effect in reducing this painful anticipation.

Every case, however, is not by any means a success. In some cases, the amnesia is complete and entire; in others, it is imperfect, and, in some, a total failure, depending a great deal upon the care with which the drug is employed, a good deal upon the constitution of the patient, and a very great deal on her surroundings. My own experience has led me to the conclusion that the results are distinctly better amongst better educated women, who are accustomed to exercise a certain amount of self-control and inhibition, than amongst women who usually are treated in hospital. I have never found in any of my cases, except one in hospital, any excitement or noisy restlessness as described by some.

Secondly, with regard to the analgesia, my experience is that when the drugs are carefully administered in a primipara, the pain is always lessened and materially modified. The women are sometimes a little restless, because they feel some pain, but they cannot locate it, and this feeling of discomfort sometimes causes them to toss from side to side.

There can be nothing more unwise than to leave the administration of the drug to nurses. One of the objections to its use in private practice is the necessity of the presence of the physician during the whole time. It is only under his supervision that the drug can be satisfactorily administered.

I cannot say that post-partum hæmorrhage is increased, because, as a matter of routine after using scopolamine-morphine, I always give an injection of "ernutin." My earlier

shortness of the labour. Again, I have used it during my terms of service at the Maternity Hospital, confining it mainly to tedious labours and primiparæ.

Many of those who write on the subject claim special success in hospital, but that has not been my experience. The failures that I have met have all been in hospital, and it is not very difficult to explain the reason. It is impossible, in hospital practice, to maintain the necessary quiet. The delivery-room is blazing with electric light, and nurses are constantly going out and in, so that the essentials for a successfully conducted, so-called "Twilight Sleep" labour are wanting. To insure complete success, a darkened room, a quiet house, and the personal influence of a good nurse are necessary adjuncts. Patients are very susceptible to sudden noise or light, both wakening them very readily from their half-slumber. Such an interval of wakefulness may allow the patient to reconstruct in her imagination the whole birth, and once the patient is roused out of the sleep, it may be difficult to restore the condition.

The dosage and method of administration vary with different writers. From the first I have never laid down a hard-and-fast rule, preferring to treat each case on its own merits. The routine method advocated by Siegel seems to me very unsatisfactory. The dosage I have employed is usually one-sixth of a grain of morphia and one-hundredth of a grain of scopolamine. In the majority of cases, after this initial dose of scopolamine-morphine, the injections are confined to scopolamine alone in doses of one two-hundredth of a grain or even less. Primiparæ will require, on an average, four or five injections, if seven to nine hours is the average duration of the sleep. During the crowning stage, I always administer a little chloroform, and I have never interfered operatively with scopolamine-morphine narcosis alone. I have always found it well to administer the injection when the labour pains are active, when the uterus is contracting at regular intervals, for I have found the too early use of the drugs is apt to diminish the labour pains. Less attention need be bestowed on the degree of dilatation of the cervix. The regularity of the pains is the main element in the administration.

The advantages claimed for the use of scopolamine-

morphine in childbirth are mainly two

First, the loss of memory. In all cases in which an extended and fair trial has been made of these drugs, and when the cases have been properly conducted, I have found, like many others, that the woman seldom retains any memory of labour and its sufferings.

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experience disposed me to think that there was a little tendency to relaxation after the third stage, but, since adopting the "ernutin" injection as a routine in these cases, I have not seen a case of hæmorrhage. One thing is quite noticeable, namely, that when any operative treatment is required, the patient responds to the influence of the anæsthetic very readily. My experience is that the patient sleeps off the effects in the course of three or four hours, and then her fresh condition is quite remarkable. She feels well and comfortable, and there is no trace whatever of any exhaustion or shock. The condition of the woman *post partum* is one of the most striking features in this treatment.

I have observed in some cases that the second stage is a little prolonged, the labour pains not being quite so strong. But a little prolongation of the second stage, while the patient is suffering no great discomfort, is of no moment.

I have not personally met with any contra-indications for the use of the drug, but I can imagine, that when the patient is suffering from disease of the respiratory organs, and when there is inertia of the uterus, or histories of short labours, this form of treatment is not desirable.

I have never met with any accident either to mother or child, either in hospital or in private. It is true the children are often born in a state of oligopnœa, in a sort of sleepy condition, not asphyxiated; but with a little usual manipulation, the ordinary respiration is rapidly re-established. I think the condition of the child is apt to convey an erroneous impression, and prejudice some against the use of this form of treatment, but, speaking from my own experience, I can only say that not one of the children has ever been a source of real anxiety.

(b) BY HERBERT WILLIAMSON, M.D., F.R.C.P.

Physician-Accoucheur to St. Bartholomew's Hospital; Obstetric Physician to the Royal Waterloo Hospital for Women and Children, etc.

THE term "Twilight Sleep" has a singularly soothing and assuring effect; it indicates a state of blissful unconsciousness from which all idea of danger is absent. If, by any drug or combination of drugs administered during childbirth,

this state can be attained, the primal curse will be made of none effect, and one result of the entrance of the serpent into Eden will cease to trouble humanity.

Articles in Sunday newspapers and popular magazines have announced the dawn of a new era in midwifery, and asserted boldly that by the administration of a combination of scopolamine and morphine, labour may be rendered painless without adding new risks to either mother or child. These claims are made by lay writers, whose aim appears to be to hear and to tell some new thing, heedless of what false impressions they may give or what harm they may do. Such claims have never been made by the men who have worked at the drugs and perfected the technique of their administration, they will certainly not be made by any observant obstetrician who has employed them in his practice.

It must not be assumed, however, that these drugs are valueless or, when properly used, dangerous. On the contrary, I regard them as of very great value when they are used in suitable cases and are administered under proper conditions. I shall state briefly what I mean by "suitable cases" and "proper conditions."

We must always bear in mind that what we aim at is neither anæsthesia nor analgesia but loss of memory (amnesia). When a woman is under the influence of scopolamine she will still have labour pains, she will still feel them, will moan a little when they occur, drawing up her legs and showing other evidences of suffering; but the memory of those pains will not be implanted in the cells of her brain, and after the labour is over she will be unaware of what she has gone through. The goal in front of us is to maintain this condition of "Twilight Sleep," with the smallest possible doses of the drug. The dose must not be too large, or the life of the child is placed in danger; it must not be too small, or "islands of memory" will interrupt the sleep, and from these islands of memory the whole course of the labour may be reconstructed by the patient.

First of all, care must be taken to ascertain that the preparation of the drug used can be relied upon. Scopolamine is difficult to prepare pure, and deteriorates rapidly, but it remains active for a considerable time in a 10 per cent. alcoholic solution of the sugar mannite. This solution

experience disposed me to think that there was a little tendency to relaxation after the third stage, but, since adopting the "ernutin" injection as a routine in these cases, I have not seen a case of hæmorrhage. One thing is quite noticeable, namely, that when any operative treatment is required, the patient responds to the influence of the anæsthetic very readily. My experience is that the patient sleeps off the effects in the course of three or four hours, and then her fresh condition is quite remarkable. She feels well and comfortable, and there is no trace whatever of any exhaustion or shock. The condition of the woman *post partum* is one of the most striking features in this treatment.

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be guarded as far as possible from sensory stimuli—she should be kept in a quiet room, the windows should be darkened, the ears should be plugged with cotton-wool, no one but the nurse and the doctor should enter the room, and vaginal examination should be avoided. As a rule, from four to six injections are required; the greatest number I have used is eight.

Indications that the Administrations should be stopped.—From the first injection, the doctor must remain with the patient. The pulse and respiration must be watched, and, if they become frequent, no further injections should be given; if restlessness or talkativeness develop, or if the patient makes attempts to get out of bed, the treatment should be stopped. The foetal heart should be examined from time to time; if it becomes unduly slowed or unduly accelerated, the child is suffering from an overdose of the drug, and its life is endangered.

Dryness of the mouth and throat are usually complained of, but do not contra-indicate further injections. They are best treated by allowing the patient to drink large quantities of water.

Effects upon Labour.—The first stage of labour is a little, but not greatly, prolonged. The second stage is much prolonged, and usually occupies three or four hours, probably because of the absence of voluntary muscular efforts; not uncommonly, it is necessary to administer chloroform and terminate the labour by the application of forceps. I have found, too, that the time occupied by the detachment and expulsion of the placenta from the uterus is prolonged, and that there is a tendency for the uterus to relax afterwards, but I have only had one case of severe bleeding. After the labour is over, the patient usually sleeps for two or three hours.

Effects upon the Child.—These effects constitute the most serious drawback to the use of scopolamine.

The drug passes readily through the placenta, and enters the blood of the child; some children are apparently but little susceptible to its action, others are very susceptible. In my cases, rather more than half the children breathed spontaneously (9 out of 17); in the remaining eight, artificial respiration was necessary, and in four breathing was established without difficulty. The remaining four gave me considerable anxiety, and

offers a convenient method of preserving the drug, and the solution should be tested from time to time by the polarimeter to ascertain whether it be still lævo-rotatory; when it ceases to be lævo-rotatory it should not be used. The drug should not be employed at the onset of labour, its administration should only be begun when labour pains are well established and the cervix is sufficiently dilated to admit a finger. It should be stopped if the contractions become decidedly weaker, and is contra-indicated in cases of uterine inertia.

The amount of the drug required varies with every individual, and can only be determined by watching the effect produced. With physiological doses, the pupil is dilated, the pulse and respiration are slowed, the sensory areas of the brain are dulled, memory for passing events is lost, and sleep is produced. With larger doses, the throat and mouth become dry, so that the patient is tortured by an unquenchable thirst, the pulse and respiration are rapid, the patient becomes restless, excited, and passes into a condition of active talkative delirium. Unfortunately, we meet with patients who are extremely susceptible to the action of the drug, and on two occasions I have seen active delirium produced by a single dose of $\frac{1}{150}$ th of a grain. These cases were most distressing, the patients had to be forcibly restrained and finally anæsthetized. Fortunately, such instances are rare, but as we have no means of detecting this idiosyncrasy, they illustrate one of the disadvantages of scopolamine.

The first dose should consist of $\frac{1}{6}$ th of a grain of morphia and $\frac{1}{150}$ th of scopolamine. After its administration some simple manipulation should be performed, which will serve as a land-mark of memory, the patient's temperature should be taken, or some particular object shown to her. Subsequent injections will consist of scopolamine alone, no more morphia is given; the second dose is given one hour after the first, and consists of $\frac{1}{450}$ th of a grain of scopolamine. From this time onwards, further injections are determined by applying the memory test, and as soon as we have evidence that the memory is returning, another $\frac{1}{450}$ th of a grain is injected.

Whilst under the influence of the drug, the patient should

the Middlesex and 100 cases at the City of London Lying-in-Hospital with injections of morphia and hyoscine, and had come to the conclusion that the method which I had employed had very little to recommend it. When Dr. Haultain's article was published, however, I saw that I had not been following the proper method, and that, therefore, my results were useless for purposes of discussion. As there was still time to give a proper trial to the method outlined by Dr. Haultain, I thought I could still send a contribution which might be of some use to the readers of THE PRACTITIONER.

I have, however, had great difficulty in procuring the necessary drugs, and, as a consequence, have only been able to try the method in a few cases. The small experience we had had with these, however, coincides with that of Dr. Haultain, in that there has been a greater percentage of instrumental deliveries and the babies do not seem to have suffered. Three of the women were *most* violent, one having to be held down by three nurses during the birth of the child and another by three nurses and two students. Their condition was more or less like that of a violent, drunken woman. Although none of the women remembered the birth of the child or any pains connected therewith, the sisters report that during the labour pains the women appeared to suffer just as much as women who had not had any injections.

The experience I have had is not sufficient to enable me to form any definite opinion on the subject of Twilight Sleep except that I am sure that no woman should be subjected to these injections of hyoscine during her labour, unless she has a very competent nurse in constant attention, who is able to procure additional assistance if necessary, and her medical attendant is prepared not only to spend a long time with her during her labour, but also to be within easy call if he has to leave her.

(d) By J. S. FAIRBAIRN, M.A., B.M., F.R.C.P., F.R.C.S.

*Obstetric Physician, St. Thomas's Hospital; Physician, General
Lying-in Hospital, York Road; Examiner, Central
Midwives' Board, etc.*

THE large amount of public attention recently directed to

one of them could not be revived. I attribute the death of this child directly to the action of the drug; the labour was a short and easy one, and the child was born spontaneously.

In 12 of the cases, I believe the pain was materially lessened; six of the mothers did not remember the birth of the child, and stated that after the injections were begun they suffered no pain. Six remembered the birth of the child, but said that they suffered less pain after the injections were given; in three, no appreciable effect was produced, and two passed into a condition of active delirium.

CONCLUSIONS.

My experience leads me to believe:—

- (1) That scopolamine and morphine injections in the majority of cases diminish the pain of labour.
- (2) That in about one-third of the cases amnesia is complete.
- (3) That in a small proportion of the cases active delirium is produced by the drug.
- (4) That labour is prolonged.
- (5) That the loss of blood in the third stage is increased, but that severe bleeding is not common.
- (6) That no other ill effects are produced in the mother.
- (7) That the danger to the child is undoubtedly increased.
- (8) That the dangers are lessened by constant and careful supervision.
- (9) That the treatment should not be undertaken unless the patient's surroundings are favourable, unless the obstetrician is prepared to remain with his patient from the first injection until labour is completed, and unless skilled help is readily available, should operative interference become necessary.

(c) BY COMYNS BERKELEY, M.C., M.D., F.R.C.P.

Obstetric and Gynaecological Surgeon to Middlesex Hospital and Surgeon in Charge of its Military Branch, Clacton-on-Sea; Senior Obstetric Surgeon, City of London Lying-in Hospital, etc.

WHEN the Editor of THE PRACTITIONER first asked me to send a communication on "Twilight Sleep," I willingly acceded to his request because I had treated 100 cases at

the Middlesex and 100 cases at the City of London Lying-in-Hospital with injections of morphia and hyoscine, and had come to the conclusion that the method which I had employed had very little to recommend it. When Dr. Haultain's article was published, however, I saw that I had not been following the proper method, and that, therefore, my results were useless for purposes of discussion. As there was still time to give a proper trial to the method outlined by Dr. Haultain, I thought I could still send a contribution which might be of some use to the readers of THE PRACTITIONER.

I have, however, had great difficulty in procuring the necessary drugs, and, as a consequence, have only been able to try the method in a few cases. The small experience we had had with these, however, coincides with that of Dr. Haultain, in that there has been a greater percentage of instrumental deliveries and the babies do not seem to have suffered. Three of the women were *most* violent, one having to be held down by three nurses during the birth of the child and another by three nurses and two students. Their condition was more or less like that of a violent, drunken woman. Although none of the women remembered the birth of the child or any pains connected therewith, the sisters report that during the labour pains the women appeared to suffer just as much as women who had not had any injections.

The experience I have had is not sufficient to enable me to form any definite opinion on the subject of Twilight Sleep except that I am sure that no woman should be subjected to these injections of hyoscine during her labour, unless she has a very competent nurse in constant attention, who is able to procure additional assistance if necessary, and her medical attendant is prepared not only to spend a long time with her during her labour, but also to be within easy call if he has to leave her.

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Obstetric Physician, St. Thomas's Hospital; Physician, General Lying-in Hospital, York Road; Examiner, Central Midwives' Board, etc.

THE large amount of public attention recently directed to

"Twilight Sleep," has, perhaps, been the means of prejudicing our judgement of its worth.

Germanic in origin and in name, "Twilight Sleep" has been taken up and boomed by our Transatlantic friends—ever enthusiastic over a new thing—and our lay press has not been behindhand. Its wonders have been vividly painted, more with an eye to what the public likes than with any praiseworthy anxiety for uninteresting accuracy, and our womenfolk, having eaten of the tree of the knowledge, now demand that the curse of Eve should be exorcized by this new charm. It has thus been forced on the family practitioner, and this, quite apart from the demand it makes on his services, has naturally produced some resentment against a method of treatment, which is, after all, a luxury rather than a necessity. It is, however, perfectly reasonable that our patients should ask that any means at our disposal, which can be used with safety to mother and child, should be employed for the relief of pain in labour, and it is incumbent on those engaged in family practice to acquire some familiarity with the morphia-hyoscine narcosis.

I propose to give, briefly, some general impressions of this method under three heads:—

- (1) Its efficiency in the alleviation of pain in labour.
- (2) Its effect on labour, as regards mother and child.
- (3) The possibilities of its general use in family practice.

1. *Its Efficiency in the Alleviation of Pain in Labour.*—

The morphia-hyoscine narcosis is undoubtedly a valuable addition to our means of easing the pains of labour. Special indications for its use are: feeble and ineffective uterine action during the first stage, especially when the patient is suffering from fatigue and loss of sleep, or is nervous and unusually sensitive; the rigidity of the cervix, which often accompanies poor pains; ante-partum hæmorrhage, in which mental and bodily quietude are advantageous; the alleviation of the pain and discomfort following many manipulative procedures, such as plugging the vagina or the insertion of a bag; prolonged labour, in which time is required for moulding of the head. Minor operations, such as low forceps delivery and perineal suture, are possible in some successful cases, but, generally speaking, a small quantity of chloroform is required, because the patient is liable

to move or wake up and become difficult to control.

Administered to primiparæ after the pains are well started and regular, and dilatation has begun, the whole labour can often be conducted without the patient having any knowledge or recollection of what has happened, whilst it is rare for it to fail in giving temporary or partial relief. The first morphia-hyoscine injection almost always brings some alleviation, and, after three or four hyoscine injections, the appreciation of pain is so far dulled that the result may be considered satisfactory. If, in a prolonged first stage, the hyoscine loses its effect, it may be necessary to give a second or even a third injection of morphia in smaller dosage. The behaviour of the patient during and between the pains, the notice she takes of the repeated pricks of the hypodermic needle, help in deciding the frequency of the injections required to maintain the effect. The memory test is not always satisfactory, and is certainly not easy to elicit, besides involving unnecessary disturbance of the patient.

Though excitement is rare, the hyoscine often produces restlessness during the pains. It is common for the patient to be quiet and drowsy between times, but to start up with the pains, and, in a semi-conscious state, to try and get out of bed. This involves very close watching, for most extraordinary things are done in this condition of semi-stupor; thirst is always a prominent symptom, and any lotion or other fluid that comes to hand may be used to quench it. As an example of this semi-conscious activity aroused by uterine contraction, a case may be mentioned in which the patient, left for a few minutes in a state of apparently deep drowsiness, was found on the floor on her hands and knees, as if hunting for something she had lost; she resisted being put back to bed, for she said she wanted to find the Crown Prince, who, she was convinced, was hiding in the room. As is the case with partial chloroform anæsthesia, this restlessness with the pains is most frequent with the contractions of the second stage, and the patient may become very obstinate and difficult to control. The condition rather suggests that of the stupidly intoxicated man, who will sleep heavily, if left undisturbed, but is most perverse if aroused, and any attempt is made to direct him. Happily, a whiff of chloroform will generally

get over the trouble. Otherwise, these cases are satisfactory, in that the patients seldom have any recollection of what they have been through. Doubtless, restlessness with the pains will become less frequent with greater experience in administration and in the selection of cases, though, as one of the intoxication effects of hyoscine, it will always be liable to occur.

2. *Its Effect on Labour, as regards Mother and Child.*—As regards effect on mother and child, it is necessary to bear in mind that any narcotism to the extent of abolishing painful stimuli must, in some degree, affect the nervous mechanism of labour. Morphia and chloroform both tend to slow uterine action by diminishing reflex excitability. Hyoscine does not seem to have this effect, for the slowing, which is generally noticed after the first injection containing morphia, soon passes off, and, with the hyoscine injections, there is a return to the previous rate of contraction. On the other hand, in women who are anxious, nervous, or abnormally sensitive to the pains, there is frequently a quickening of the labour, probably due to the mental quietude and analgesia preventing inhibition of the uterine action from emotional causes. The bearing-down efforts in the second stage are greatly diminished, and the patient will rarely make any effort. On the whole, this method of partial anæsthesia seems scarcely to affect the duration of labour, and to interfere less with its natural processes than any other at our command.

As regards the child, the apnœic condition at birth, which has been frequently commented on, appears to be determined by the amount of morphia used, the stage of labour at which it is administered, and the development and vigour of the child. It is most likely to be noticed after repeated injections containing morphia—the hyoscine seems to have little influence. One of my house-physicians at the General Lying-in Hospital called attention to this point in a paper, contributed to the weekly medical press about eight years ago, in which it appeared as the result of his investigations that morphia, given within the four hours preceding birth, frequently gave rise to difficulty in starting respiratory efforts. This effect on the child, as might be expected, is most likely to be present with small,

weakly, or premature babies, and hence caution is required in premature labours, or when feebleness of the child is suspected. A good working rule is to avoid morphia in the second stage if the head is engaged, or if delivery appears probable within six hours. Resuscitation is generally easy, though two cases of stillbirth without any adequate reason being discovered have come to my notice, in which pituitary extract was given at the end of a "Twilight Sleep" labour.

3. *The Possibilities of its General Use in Family Practice.*—There are many difficulties to be overcome before the morphia-hyoscine narcosis can be generally adopted in family practice. When induced to the full degree, it entails constant watching of the patient by skilled nurses and frequent visits by the practitioner. In the lying-in ward at St. Thomas's Hospital, special nurses have been necessary owing to the frequency with which the patient requires control. In a private house, apart from special arrangements to secure the necessary quietness and isolation, a maternity nurse experienced in the treatment, and, in cases of long labours, a second nurse to relieve her, would be necessary. Indeed, the requirements are such that it would probably be advisable for the patient to go to a nursing home within easy call of her medical attendant. It certainly involves greatly increased expense to the patient, and it would appear that the induction of the so-called "Twilight sleep" will be a luxury only for those willing to pay for it. The busy family practitioner would certainly require a considerably increased fee to compensate for the greater tax on his time and attention. Reserved for long and tedious labours, and for cases presenting the special indications already mentioned, it is a valuable addition to our methods of managing difficult and prolonged labour.

(e) BY ANNIE McCALL, M.D.

Medical Director of Clapham Maternity Hospital.

NOTES ON THE VALUE OF THE HYOSCINE-MORPHINE TREATMENT
DURING LABOUR.

APPENDED are notes of nineteen cases treated with hyoscine-morphine or hyoscine at the Clapham Maternity Hospital

since October 15, 1916. Our routine method in labour, which I introduced many years ago, consists of:

1. A very hot bath, as *hot* as the patient can bear it, for a quarter of an hour or even twenty minutes. This bath is repeated frequently before and during the first stage of labour, and sometimes in the second stage.
2. A very hot enema of soap and water, to strengthen the uterine contractions, repeated at intervals, if need be.
3. A dose of gr. xv. of chloral hydrate given in water or milk, but with the precaution of making the patient hold her nose, for the smell is nauseating; if this precaution is omitted, vomiting often results, and the work of this very valuable help is lost.

These three measures follow on the preliminary treatment of avoiding protein food for the last two months of pregnancy, taking plenty of regular steady exercise *daily*, especially up-hill, and hot baths daily for the last few weeks. Fruit diet is taken if possible, or as much as possible.

I feel bound to mention these facts before giving my notes, for I think we have already found the way to lessen very considerably the painfulness and prolongation of ordinary labour. This, I think, is perhaps why I have not been much impressed with the advantages of hyoscine-morphine treatment.

CASES.

I.—Mrs. G., 21, M₂; admitted 4 p.m., October 15. Labour began 11 a.m.; pains every five minutes. Membranes ruptured. Bath and enema. Head low and very *hard*; pains every two minutes. At 5.15 p.m. an hypodermic injection of gr. $\frac{1}{200}$ of hyoscine hydrobromide and gr. $\frac{1}{4}$ morphine hydrochlor., was given in the arm. At first the patient complained of the pains being distressing, but in a few minutes she seemed soothed and quiet, and, at 5.30 p.m., began to bear down quietly. At 5.45 p.m. a girl of 7 lbs. 5 ozs. was born, V₂. The baby cried at once. The uterus was *very variable* and difficult to keep; placenta expelled at 6 p.m. with a *large* clot in it. Patient was sleepy; pulse, 72; later on, 60. 6.50 p.m., uterus firmer but large. Patient had the idea she did not sleep well. Uterus remained somewhat large, and did not disappear until the thirteenth day.

II.—Mrs. W., 32, M₂; admitted 7 p.m., October 15, having had irregular pains for a week. Pains became regular at 2 a.m., occurring

every 15 to 20 minutes. Hot bath and enema; pains still about every 15 minutes. 8 p.m., os size of half-a-crown. 8.20 p.m., hyoscine hydrobromide gr. $\frac{1}{100}$ and morphine hydrochlor. gr. $\frac{1}{4}$ hypodermically. Patient, in 20 minutes, was fast asleep between the pains; volunteered the remark: "That pain was not so sharp." Patient sleepy between pains. 9.30, second stage, and at 10.15 p.m. delivery of girl, 6 lbs. 4 ozs., in unruptured bag of membranes; head soft; pulse, 76; *uterus variable*. Placenta expelled 15 minutes later with some hæmorrhage in the form of clots. Pulse, 72. Baby cried at once, good colour; uterus disappeared on twelfth day.

III.—Mrs. B., 32, M₃; admitted 6.30 a.m., October 16, with pains every three or four minutes only since 6 a.m. At 8.30 a.m., os size of half-a-crown; membranes ruptured. 8.45 a.m., hyoscine gr. $\frac{1}{100}$ and morphine gr. $\frac{1}{4}$; pulse, 76. 9.30 a.m., second stage. Patient heavy with sleep but takes pains properly, and, at 9.55 a.m., girl born, 6 lbs. 6 ozs. Uterus good; very slight hæmorrhage. Baby was very cyanosed when born, and began to breathe very slowly. Pulsation in cord very slow. Child did not cry until after cord was cut; pulse, 64.

IV.—Mrs. W., 31; admitted 9.30 p.m., October 15, with history of rupture of membranes. Chloral, bath, and enema; not in labour. October 16, 5 a.m., pains severe and regular; patient cries out with every pain. Presenting part not entered pelvis. 6.40 a.m., hyoscine gr. $\frac{1}{100}$ and morphine gr. $\frac{1}{4}$; asleep at 7 a.m.; pulse, 64; pains every four minutes. 9 p.m., pains every three minutes; patient awakes for pains, very much soothed. 9.30 p.m., second stage pains. 10 p.m., uterus bulging; V₂ low. Tight vagina; pulse, 80. 10.50 and 11.50 p.m., quin. sulph. gr. v. with good effect. Patient conscious but sleepy; pupils dilated; complains of giddiness when up and much thirst. 11 p.m., membranes ruptured; patient requires much help in taking pains properly. 12.30 a.m., October 17, pulse, 96; pains weak. 1 a.m., vertex visible. 1.30., pulse, 136. Perineum becomes œdematous, and bad colour. 2.5 a.m., delivery (slow) of boy, 7 lbs. 8 ozs., in V₂; no laceration. Uterus somewhat variable; pulse, 96. Child cyanosed. Warm bath and artificial respiration; recovered after 15 minutes. Uterus had not disappeared on fourteenth day.

V.—Mrs. M., 38, M₆; admitted 2.15 a.m., October 18. Os size of two-shilling piece. Hyoscine gr. $\frac{1}{100}$ and morphine gr. $\frac{1}{4}$; in 10 minutes asleep or dozing; hardly seemed to feel pains, which were every seven minutes; pulse, 68. 5.50 a.m., delivery girl, V₁. Baby did not cry for some time, and heart beat slowly. Uterus good.

VI.—Mrs. A., 19; admitted 10.30 p.m., October 17, with pains every 10 minutes. 11.30, hyoscine gr. $\frac{1}{100}$ and morphine gr. $\frac{1}{4}$. 11.40, slept; 18th, woke at 2.30 a.m., asked for drink, slept again until 8 a.m., just rousing for a minute now and then. Pains quite

gone. 1.30 p.m., pains begin every five minutes. 5.30 p.m., os size of two-shilling piece; bath and chloral. 8 p.m., second stage. 8.50 p.m., delivery of boy, 6 lbs. 2 ozs.; some considerable hæmorrhage. Uterus variable; ergot $\frac{3}{4}$ ss. Uterus $1\frac{1}{2}$ in. above pubis on fourteenth day; child quite lively.

VII.—Mrs. H., 34, M₃; admitted 11 p.m., October 19. 11.50, os size of two-shilling piece, thick and rigid; V. high. 20th, hyoscine gr. $\frac{1}{80}$ and morphine gr. $\frac{1}{4}$. 1.10 a.m., sleeping soundly between pains, which were not very strong. Pains go off for a quarter of an hour. 2 a.m., pains continue without any apparent pause. Patient complained all the time of the pains with a drowsy voice, and was thirsty. 2.5, second stage. 3.50 a.m., delivery of boy, V₂; pulse, 74. Baby limp, blue in face, cord pulsating *slowly*; hot bath, artificial respiration. Began to breathe slowly. Second hot bath; stopped breathing. Artificial respiration again; cried only after 20 minutes. Remained somewhat blue for some days.

VIII.—Mrs. P., 19; admitted 4.15 a.m., October 22, with pains since 9 p.m., 21st. 5.20 a.m., os size of four-shilling piece. 5.40, hyoscine gr. $\frac{1}{80}$ and morphine gr. $\frac{1}{4}$; patient slept between pains. 7.30, second stage. 9 a.m., quin. sulph. gr. v., and again at 10 a.m. 11.30, delivery of boy in V₄, 8 lbs. 1½ ozs., with help by Retgen's method difficult; considerable hæmorrhage; pulse, 136. Placenta expelled; uterus variable. Uterus 2 in. above pubis on fourteenth day.

IX.—Mrs. R., 35; admitted 11 a.m. on October 22. Pains gone 10 p.m., 20th. 6 p.m., os size of a shilling. October 23, 8.30 a.m., had pains every few minutes all night. 10 a.m., enema and bath. V₃; lip all round. 12.15 p.m., hyoscine gr. $\frac{1}{80}$, morphine gr. $\frac{1}{4}$. Slept for 20 minutes; pains very slight; slept again, then irregular pains not so severe every 5 to 12 minutes. 5.30 a.m., said a pain caught her in back; *not* bearing down. Vertex visible. Pains very slight. 5.40 a.m., quin. gr. v., and again at 7.10 a.m. Pains still very slight, far between. 8.30 a.m., delivery of girl, V₂; baby good colour, cried at once; uterus good. Uterus down on fifteenth day.

X.—M. T., 18; admitted 9.15 p.m., October 22, at beginning of labour. Os size of a sixpenny piece, rather tight and rigid. Chloral, gr. xv; bath and enema. 23rd, early bath. 10 a.m., bath and enema. 1.30 p.m., chloral; os size of a shilling. 6.15 p.m., os size of half-a-crown; pains every three to four minutes; pulse, 120. Hyoscine gr. $\frac{1}{80}$ and morphine gr. $\frac{1}{4}$, 6.35 p.m. 6.50 p.m., patient slept between pains, seeming to feel them less, though rousing for them every five minutes; thirsty; pulse, variable from 90 to 120. After 12 midnight, pains felt more, but slept between. 24th, 5.30 a.m., second stage. 6 a.m., membranes ruptured; hot baths. 7 a.m., quin. sulph. gr. v. 7.30 a.m., delivery of girl, V₁; pulse, 120. Baby breathed at once, and soon cried. Slight hæmorrhage.

Uterus $1\frac{1}{2}$ in. above pubis on fourteenth day.

XI.—A. M., 19; admitted 1.45 p.m. Membranes ruptured; labour began 3.30 p.m. 6.30 p.m., os size of half-a-crown. 7 p.m., hyoscine gr. $\frac{1}{200}$, morphine gr. $\frac{1}{4}$; patient did not sleep. Strong pains every few minutes. 8 p.m., vertex visible. 9 p.m., delivery of boy; V_1 . Baby limp and white, scarcely breathing. After 10 to 15 minutes' artificial respiration, heart improved, and he cried a little, but remained heavy and sleepy. 10.15 p.m., baby became very bad colour, and seemed to cease breathing. Hot bath and artificial respiration used again, until breathing and colour improved. The baby remained limp and feeble. Third stage normal.

XII.—Mrs. I., 35; admitted 9.40 a.m., October 26, with history of membranes rupturing 11 p.m. on 25th. At 10 p.m., os size of half-a-crown. Hyoscine gr. $\frac{1}{200}$ and morphine gr. $\frac{1}{4}$, at 11.30 p.m. Slept well between pains, which continued good. 6.30 a.m., 27th, second stage. Pains go off. 7.15 a.m., quin. sulph. gr. v., repeated at 8 a.m. 8.45 a.m., delivery of boy; cried well at once. Third stage normal.

XIII.—G. H., 16; admitted 5 a.m., November 11. At 2.30 p.m., pains very painful and patient noisy. Hyoscine gr. $\frac{1}{100}$ (no morphine). Patient was soon quite quiet and pains soothed. Thirsty. 4.10 p.m., delivery of boy, very good colour. Third stage normal.

XIV.—Mrs. H., 34; admitted 10 p.m., November 11. Pains every 10 minutes. Labour begun, pains fairly constant, 4.30 a.m., 12th, os size of a five-shilling piece; anterior lip swollen (three hot baths, two doses of chloral hyd.). Os down very low, visible, and discoloured. 12 noon, hyoscine gr. $\frac{1}{200}$. Slept between pains; pains easier. 2.30 p.m., hot bath; os not so swollen; pulse, 86. 3 p.m., chloral gr. xv., tr. opii. \mathcal{M} xv.; some good sleep after that. 10.15 p.m., bladder distended; catheterized 18 ozs.; sp. gr. 1022. Trace of albumen. Patient on back to relieve tension on anterior lip. 10.45 p.m.; anterior lip much softer. Chloral and tr. opii repeated. Patient slept between pains. 13th., 4 a.m., vomited; slight pains every 10 minutes. 6.30 a.m., vomited. 1.30 p.m., hot bath and chloral; vagina cool and moist. 6 p.m., catheter passed 24 ozs. urine. Membranes ruptured artificially; pulse, 104. Baths and hot vaginal douche, carbolic acid, 1 in 60. 8 p.m., quin. sulph. gr. v., repeated 9.15 p.m. 9.40, vomited; head large but not hard. Child passing meconium. 10 p.m., forceps applied with care, as trace of anterior and lateral lip still persist. Several slight tractions and then stronger ones; then forceps removed for one pain and re-applied; removed, and delivery effected by hand with some difficulty in V_2 . Boy, 10 lbs. 4 ozs., in asphyxia pallida. Hot bath and Sylvester method of artificial respiration successful after 20 minutes; pulse, 120. Some slight hæmorrhage and clots. Ergot 3 ss. Vaginal douche of lysol. Some lateral laceration; two

gone. 1.30 p.m., pains begin every five minutes. 5.30 p.m., os size of two-shilling piece; bath and chloral. 8 p.m., second stage. 8.50 p.m., delivery of boy, 6 lbs. 2 ozs.; some considerable hæmorrhage. Uterus variable; ergot $\frac{3}{4}$ ss. Uterus $1\frac{1}{2}$ in. above pubis on fourteenth day; child quite lively.

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VIII.—Mrs. P., 19; admitted 4.15 a.m., October 22, with pains since 9 p.m., 21st. 5.20 a.m., os size of four-shilling piece. 5.40, hyoscine gr. $\frac{1}{200}$ and morphine gr. $\frac{1}{4}$; patient slept between pains. 7.30, second stage. 9 a.m., quin. sulph. gr. v., and again at 10 a.m. 11.30, delivery of boy in V₄, 8 lbs. 14 oz., with help by Retgen's method difficult; considerable hæmorrhage; pulse, 136. Placenta expelled; uterus variable. Uterus 2 in. above pubis on fourteenth day.

IX.—Mrs. R., 35; admitted 11 a.m. on October 22. Pains gone 10 p.m., 20th. 6 p.m., os size of a shilling. October 23, 8.30 a.m., had pains every few minutes all night. 10 a.m., enema and bath. V₃; lip all round. 12.15 p.m., hyoscine gr. $\frac{1}{200}$, morphine gr. $\frac{1}{4}$. Slept for 20 minutes; pains very slight; slept again, then irregular pains not so severe every 5 to 12 minutes. 5.30 a.m., said a pain caught her in back; *not* bearing down. Vertex visible. Pains very slight. 5.40 a.m., quin. gr. v, and again at 7.10 a.m. Pains still very slight, far between. 8.30 a.m., delivery of girl, V₂; baby good colour, cried at once; uterus good. Uterus down on fifteenth day.

X.—M. T., 18; admitted 9.45 p.m., October 22, at beginning of labour. Os size of a sixpenny piece, rather tight and rigid. Chloral, gr. xv; bath and enema. 23rd, early bath. 10 a.m., bath and enema. 1.30 p.m., chloral; os size of a shilling. 6.15 p.m., os size of half-a-crown; pains every three to four minutes; pulse, 120. Hyoscine gr. $\frac{1}{200}$ and morphine gr. $\frac{1}{8}$, 6.35 p.m. 6.50 p.m., patient slept between pains, seeming to feel them less, though rousing for them every five minutes; thirsty; pulse, variable from 90 to 120. After 12 midnight, pains felt more, but slept between. 24th, 5.30 a.m., second stage. 6 a.m., membranes ruptured; hot baths. 7 a.m., quin. sulph. gr. v. 7.30 a.m., delivery of girl, V₁; pulse, 120. Baby breathed at once, and soon cried. Slight hæmorrhage.

hæmorrhage. Uterus good. Child slightly blue, cried at once; pulse, 64.

SUMMARY.

Since October 15, we have had 102 cases in hospital, and, comparing the hyoscine cases with those under our ordinary treatment, we notice a tendency to uterine inertia, decided in some cases, quite absent in others, which tends to give rise to variable uterus post-partum and to less satisfactory involution of the uterus afterwards. When quinine is given in the second stage, these are not so evident.

I have seen no case of restlessness, as described by some authors, but we have given mostly only single doses, and I do not feel inclined to increase the amount; rather I want to use hyoscine alone, getting the sedative action from chloral hydrate or tincture of opium. In one case, apparently, it stopped the labour pains entirely for fourteen hours, and it often seems to lengthen out the labour, which is a grave disadvantage.

The condition of the child, known as oligopnœa, sometimes gives rise to some anxiety, but, in the cases in which no morphine was used, this sleepy condition does not occur. We have not found the condition occur after the use of tr. opii or after chloral, and we are now trying hyoscine alone, as in the last few cases. We have not used the drug in any case in which we required specially good action of the uterus, as in contracted pelvis, twin labour, or ante-partum hæmorrhage.

I think the drug or drugs have a distinct place in our management of labour, though, personally, I have more to learn about it. In some cases, it is of the greatest value, but it is not suitable for general use, and I deplore the advertisement of it as "Twilight Sleep" in the lay press.

(f) BY P. L. GIUSEPPI, M.D., F.R.C.S.

Surgeon to the Cliff Military Hospital, Felixstowe.

SOME HINTS ON THE ADMINISTRATION OF HYOSCINE-MORPHINE,
ANÆSTHESIA IN CHILDBIRTH.

THOUGH many years have elapsed since Kronig's first paper

stitches. Convalescence good.

XV.—Mrs. K., 36, M₃; admitted 1.30 a.m., November 21. 2.30 a.m., os size of two-shilling piece; hyoscine gr. $\frac{1}{400}$. Patient fell asleep at once; pains regular but not felt. 3.10, perineum bulging. 3.30 a.m., delivery of boy; cried lustily. Third stage normal. Patient sleepy but declared she has not slept.

XVI.—Mrs. M., 21; admitted 9 a.m., November 23. Labour since 5 a.m.; bath and enema. 1 p.m., os size of half-a-crown. Pains every five minutes. Uterus bulging, very low. 1.45 p.m., hyoscine gr. $\frac{1}{300}$; patient did not sleep, and pain continued strong. No apparent rest. 2.30 p.m., membranes ruptured. Pains strong. 3 p.m., vertex visible. 3.15., delivery of girl in V₂; cried at once, but was a little cyanosed. Uterus good. Third stage normal.

XVII.—Mrs. H., 21; admitted 5 a.m., pains every 20 minutes. Bath and enema. 12 noon, os size of two-shilling piece. Uterus bulging, very low. 2 p.m., hyoscine gr. $\frac{1}{300}$; patient was very quiet and took pains well, but did not sleep. 3.20, membranes ruptured; pains strong. 3.45 p.m., delivery, boy, V₁. Baby good colour, and cried at once. Third stage normal.

XVIII.—Mrs. S., 39; admitted 8.30 a.m., November 20. Bath and chloral. Pains since 5 a.m. 12 noon, os size of a shilling; vertex soft and low. Pains every two minutes. 6 p.m., enema and bath. 7 p.m., hyoscine gr. $\frac{1}{300}$ and morphine gr. $\frac{1}{8}$. Patient felt pains very little, slept a good deal. 9.30, pulse became full and somewhat hard; changed in character definitely. Chloral gr. xv. 10.50 p.m., pulse softer and more compressible. 10 p.m., os size of four-shilling piece. Slight pains every two minutes, but no force in them. 1.20 p.m., quin. sulph. gr. v., repeated at 5 a.m. 6.30, lip all round; pains went off gradually, and patient remained not suffering much, taking food. Catheterized twice, 37 ozs.; no albumen. November 23, F.H.S. heard clearly on left side; pulse, 68; no indication for interfering. Condition good. 5.30 a.m., slight pains every 10 minutes and continue all day. 5 p.m., pains stronger. 6.15 p.m., anterior lip persists, vertex, low. Catheter used, 38 ozs. 7.10 p.m., forceps applied; four tractions (gentle). 7.20 p.m., delivery of boy, V₁, still-born. Very offensive. Uterus not good, flabby, and difficult to make contract. Placenta expressed with difficulty; some hæmorrhage; pulse, 120. Vaginal douche, 1 in 60 carbolic acid. Ergot. citrate gr. $\frac{1}{100}$. Uterus improving still, very variable. Pulse, 128.

XIX.—November 24, Mrs. S., 24, M₂; admitted 9.45 a.m. Labour since 2 a.m.; pains every five minutes; os size of half-a-crown; pulse, 104. 12.15, hyoscine gr. $\frac{1}{400}$ and gr. xv. of chloral hydrate. Patient dozed; took pains well every two or three minutes. 1.45 p.m., show. 3 p.m., second stage. 4 p.m., delivery of boy, 8½ lbs., V₂. 4 p.m., placenta expelled immediately. Very slight

hæmorrhage. Uterus good. Child slightly blue, cried at once; pulse, 64.

SUMMARY.

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I have used it in a large number of cases, and, in this short paper, I shall content myself with hints that, I hope, may prove useful to those to whom the idea is new.

Hyoscine should be kept in tablet form, and not in solution. All solutions tend to decompose rapidly.

I feel sure that the safest initial dose is: hyoscine, gr. $\frac{1}{100}$; morphine, gr. $\frac{1}{4}$. This dose should not be given until the patient complains of the severity of the pains. To give the first dose in all cases as soon as the os can admit two fingers is a dangerous practice, because many doses will have to be injected before the termination of the labour, and each additional dose adds to the danger of the method.

Morphine should never be repeated, on account of the danger to the foetus. Hyoscine can be repeated in small doses of gr. $\frac{1}{250}$ to gr. $\frac{1}{100}$. The foetal heart should be carefully auscultated from time to time, and if its rate becomes dangerously slow or quick, delivery should be hastened with forceps.

In an article on this subject by Haultain and Swift, in the *B.M.J.* of October 14, 1916, the authors apparently never listen to the foetal heart; in fact, the authors state that a nurse can quite easily administer doses of gr. $\frac{1}{450}$ hourly!

Such a practice will most certainly end, sooner or later, in disaster to the infant.

Many babies are born in a condition of blue or white asphyxia. In a series of 100 cases, no babies were lost.

Labour is only very slightly lengthened, there is little increase in the necessity for forceps, and no increase in the incidence of post-partum hæmorrhage. To keep patients in a dark room in private houses is practically impossible.

This method should not be used in country practice, unless the nurse is skilled in the administration of the drug and the doctor can be fetched quickly, or is present during the whole of the delivery.

It is of special value in primiparæ, especially when nervous,

in heart lesions, and when the cervix dilates slowly.

The object of the method is not to produce complete unconsciousness, but twilight sleep, during which pain is either absent or very slight,² and the repetition of the drug should be gauged by the $\frac{1}{2}$ amount [of suffering of the patient.

(g) By J. P. HEDLEY, M.B., M.C., M.R.C.P., F.R.C.S.

Obstetric Physician (with Charge of Out-patients), St. Thomas's Hospital, etc.

THE administration of morphia hydrochloride gr. $\frac{1}{4}$ and hyoscine hydrobromide gr. $\frac{1}{150}$ followed by doses of $\frac{1}{450}$ gr. of the hyoscine every hour during childbirth, has no obviously bad effects on the mother or the child.

In the majority of cases, the amount of suffering is decidedly decreased, and in many there is only a hazy, if any, recollection of the process of labour.

At St. Thomas's Hospital, all the patients to whom I have given this treatment, have been primigravidae. The patients have not the same self-control as those to whom no drug has been given, and require a nurse constantly with them; they are inclined to move about excessively during the pains, and do not bear down strongly; as a consequence, the number of forceps cases has been more than doubled.

I consider this treatment most useful in cases in which the first step of labour is tolerated badly, and when it seems likely to be long.

I never give the initial dose in the second stage, because the chances of getting a good result are small, and because it has the effect of making the babies blue and sluggish at birth. In this stage, chloroform seems to me to be more suitable.

(h) By M. W. KAPP, M.D.

San Jose, California, U.S.A.

PAINLESS AND SHOCKLESS PARTURITION—A MODIFIED
"TWILIGHT SLEEP."

PAIN and fear produce shock to the system, no matter from what source these may come. Every doctor of large expe-

it is only now that the subject is being considered in this country. Since my first paper in *THE PRACTITIONER* in July, 1911, very few papers have appeared, two or three at most, showing conclusively the little interest that has been aroused in the Profession by this method of controlling pain in labour.

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off, I sometimes give a half-dose, but if the pains are rather strong, I give another full dose. I have given as many as five doses in the course of a confinement, but one to three doses are usually all that I find necessary.

When I give a dose, I always explain to the patient, that within 15 minutes she will feel the pains very much less, but when she feels the contractions of the uterus she must bear down, using all her voluntary forces, to aid in expelling the child. She may feel sleepy between the pains, and many actually fall asleep then, but at all times her mind will be clear so that she is able to assist the doctor in every way that he may wish.

Some doctors have informed me that they enjoin the quiet and darkness of the Freiburg Twilight method, and like it very much. I rarely insist on the quiet and darkness. In fact, I usually talk to the patient and urge her to make her best efforts to expel the child. I often give the one-twelfth of a grain dose, and then go about my business making calls or attending to my work; when the pains become hard again, I return to my patient and give her another injection. If I have given the drug intelligently, using it to its largest tolerated dose, that is, the dose that eases but does not retard the pains, then the last pains can be undergone without the assistance of chloroform or ether, though there is no objection to using either.

I have repeatedly delivered with forceps, using only the acetomorphine to ease the pain. A slow delivery case has been hastened by using pituitrin in small doses. Acetomorphine allows plenty of time for bringing the head over the perineum, and will save many lacerations.

I have had no oligopnoea with this method. I am convinced that this is invariably produced by the head lying low in the pelvis for too long a time. I have often seen oligopnoea in cases in which no drugs whatever had been used, but labour had been very prolonged.

The special points to which I wish to call attention in my method are the following. It is safe and simple, so that it can be used in humble as well as in wealthy homes. It reduces shock almost to nothing. It does not affect lactation. It can be used in normal as well as in abnormal cases. It is of help in all cases, excepting those of uterine

rience has seen women enter the pregnant state, pass through the parturition stage, and emerge such wrecks that neither the hands of surgeons nor time can ever heal. Every surgeon with knowledge will try and save his patient from shock—that is, pain, fear, and worry. The same surgeon, however, will let a woman suffer pain hour after hour, and think it a matter of no importance, because—well, because he has not thought correctly about it.

I believe that the fear, worry, and pain of parturition can be eliminated, and that this can be done with safety to the mother and child. Five years ago, it occurred to me to try acetomorphine hydrochloride for the pains of labour. I had the surprise and joy of my life. I have used this drug ever since in general practice, and I have a large obstetrical practice for a general practitioner, but I have not had one bad result that could be attributed to its use. I am in touch with many doctors throughout the United States, who are using this drug constantly, and all are strong in praise of the method and of its safety to mother and child.

I will give here a short *résumé* of this method; a fuller report appeared in the *New York Medical Record* of August 5, 1916.

When a pregnant mother engages me to attend her during her pregnancy and confinement, I calm her fears by assuring her that the pains in her confinement can be so modified that she will not mind them. As soon as I am called to her, when she is in labour, I carefully ascertain if her pains are real labour pains. In a primipara, I always wait until the pains are rather severe, so that she may appreciate what real labour pains are. In multipara, I give the acetomorphine as soon as the pains are beginning to get hard. I do not care what the stage of labour is, the severity of the pain is my guide. I have often given it before any dilatation has started. It benumbs and relaxes the parturient canal, and makes hastening of labour possible.

After much experimenting, I have found that the average ideal dose of acetomorphine hydrochloride is one-twelfth of a grain, given hypodermically. The effect of one dose usually lasts from two to three hours. When this wears

NOTES ON THE TREATMENT OF PLACENTA PRÆVIA.

By JOHN BENJAMIN HELLIER, M.D.

Professor of Obstetrics in the University of Leeds; Hon. Obstetric Physician to the Leeds General Infirmary; Examiner to the Conjoint Board of the R.C.S. & R.C.P., London.

IN text books of midwifery, the terms *placenta prævia* and *unavoidable hæmorrhage* are practically interchangeable. The placenta is implanted on the lower uterine segment; when that dilates and the placenta begins to be detached, hæmorrhage is inevitable. This beginning of hæmorrhage is the first indication that the placenta is wrongly placed, and, until someone finds a way of diagnosing placenta prævia before the first hæmorrhage occurs, such hæmorrhage must continue to be *unavoidable*. The problem meanwhile for the obstetrician is, assuming that the first hæmorrhage has occurred, what can be done to avoid further hæmorrhage.

This is a very serious problem in civil practice, for there is at least a 10 per cent. chance of losing the mother, and three or four times that risk of losing the child. Further, to-day the obstetrician thinks not only of preventing mortality, but of checking *morbidity* as well; he wishes to secure not only that the mother shall not die, but that she shall not suffer from a long period of anæmia caused by loss of blood, and that she shall have no septic infection or cervical laceration brought about during the treatment. What has the modern obstetrician to offer by way of criticism on the older methods of treatment, and has he anything better to offer in their stead? Let us attempt a brief review of the subject.

There are two routes by which placenta prævia may be treated: First, by the vaginal route, which is the old established way; secondly, by the abdominal route, by hysterotomy, otherwise called Cæsarean section—a modern expedient which, under certain circumstances and in favourable cases, may be strongly recommended.

The principle of treatment by the vaginal route may be

inertia, but even in these I often use it, forcing the pains by giving pituitrin. It produces analgesia, but little amnesia. It does not impair the voluntary forces that aid in expelling the child. It does not produce oligopnœa or any untoward effects on the child. It is as useful to the doctor far from a hospital as to one in a hospital. The dose is one-twelfth of a grain, repeated as necessary. It is the cheapest and most workable method yet brought out. It calls for judgment in use, but any doctor with knowledge of the use of an hypodermic syringe and of the action of acetomorphine, and with common sense enough to adapt its use to the peculiarities of each individual case, can use it, and lessen the pangs of the lying-in chamber.

If English doctors will only give my method a trial in their next ten cases, I am sure they will always use it.

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The principle of treatment by the vaginal route may be

put in a nutshell. The method consists in plugging the lower uterine segment so as to compress the vessels in the placental site. To do this, you must use a natural plug if you can, or, failing this, a temporary artificial plug. The best natural plug is the foetal head, and sometimes this is available. This is the case when the placenta is only partly covering the cervix, the head is presenting with unruptured membranes, and there is slight separation of the placenta from the lower uterine segment. On puncturing the membranes, the head descends, fills up the lower uterine segment, compresses the placental site, and arrests the bleeding. Presently, natural uterine action completes delivery. The forceps may sometimes be useful to pull down the head till the bleeding is stopped; then they are taken off, and labour pains awaited.

But often we cannot get the head. It may not be presenting, or the placenta may be in the way. Then the best natural plug is the half-breech. We turn, preferably by bi-polar version, and bring down a leg. If we were limited to one method of treatment in all cases, version would be the one to choose. To adopt Herman's phrase: *Early version, followed by slow extraction*, describes the method. A very large number of cases are successfully treated by this plan. If the os be not dilated enough to turn, we can employ a temporary artificial plug, and the best is the balloon of Champetier de Ribes. This was introduced into practice in 1888, and was an improvement of Braune's colpeurynter. It is a good instrument; it plugs efficiently, and dilates the cervix without laceration. The strictest asepsis is demanded in this and every method.

The old plan of *accouchement forcé*, which means forcible digital and manual dilatation with rapid extraction, is now strongly condemned by the best authorities. It is liable to cause shock, laceration of the cervix, and hæmorrhage, and it yields the highest mortality of any method of treatment in this condition. The use of Bossi's mechanical dilator in placenta prævia is strongly condemned by the experience of those who have used it. Vaginal Cæsarean section, which means slitting up the cervix to the os internum, has been tried only to be abandoned, and has no future before it in this condition. The old method of

separating the placenta and then extracting the child is obsolete, so far as I know.

Simply plugging the vagina is a very inefficient method of treatment, and a broken reed to lean upon. It is the lower uterine segment, and not the vagina, that needs plugging.

One point may be emphasized in this consideration of the vaginal route. When the lower uterine segment has been plugged, *the mistake of proceeding to immediate extraction* must not be made. The temptation to do this is considerable to the inexperienced. We can take a good hold of the foetus, and can, if we wish, quickly get the case over. As the child's life is endangered by delay, why not complete delivery at once? The following are sufficient reasons: The patient has already lost much blood; she is suffering from shock, increased by version under chloroform, and is probably suffering from uterine inertia; if we deliver rapidly, there will be more shock, perhaps laceration of the vascular cervix, and if the uterus is rapidly evacuated, the ante-partum hæmorrhage will be followed by post-partum hæmorrhage, which may prove fatal. On the other hand, if, having arrested the hæmorrhage, we wait, we can treat the shock, transfuse the patient, and give oxytoxics. The pulse will improve, the patient's condition will get stronger, and, in due course, uterine action will come on; the child will then be expelled naturally, and the retraction of the uterus will prevent post-partum hæmorrhage. I admit that this gives the child a worse chance, but the life of the mother is the prime consideration. I am sure that I have seen death result from too rapid extraction after version; this must be my excuse for dwelling on this elementary principle.

We will now consider the following case. A patient is in the last month of pregnancy, but there is no sign of labour beginning. She is seized with spontaneous hæmorrhage, and has a smart flooding. We keep her in bed, and the bleeding stops. What shall we do? Shall we wait and watch, in the hope that things may right themselves? The danger is that, at any time, the bleeding may recur; in fact, it is almost certain that it will recur, and may prove fatal before we can deliver her. There is a general agreement

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in view of the contracted pelvis, would have been an anxious, difficult, and dangerous matter, and, in all probability, I should have had to sacrifice the child.

Another case, which has been already published in the *Lancet*, August 7, 1915, I will give in brief:—

A medical man brought to me his wife in March 24, 1915. She was 32 years old, and was then in the 33rd week of her first pregnancy. She was suffering from albuminuria, with œdema of face, and hands, and feet. I recommended treatment by confinement to bed, with milk diet, purgatives, diuretics, and diaphoretics. She got somewhat better at first, but the albuminuria increased later, and she began to have some toxic symptoms. On April 25, she had a sudden attack of spontaneous uterine hæmorrhage, due to placenta prævia. I saw her at home, and asked her husband if he would bring her to Leeds at once, and allow me to treat her by Cæsarean section. She came into a Leeds nursing home the same evening. At that time, she could hardly see because of toxic eye disturbance. Next morning, I performed Cæsarean section. The child was delivered alive, breathed readily, and weighed $4\frac{1}{2}$ lbs. The placenta occupied the lower two-thirds of the uterine wall on the antero-lateral aspect, and a tongue of placenta reached down into the cervix with a blood clot hanging from it. It was very easy to peel off the placenta with a piece of gauze, and practically no hæmorrhage was caused by the extraction. She made an excellent recovery, and the wound healed *per primam*. In four days she could read clearly, there was no rise of temperature and no fœtor of the lochia; in three weeks, the urine was free from albumen. She suckled her child, which has thriven exceedingly well.

In this case, we obviated the dangers of placenta prævia, as well as those of the threatened eclampsia.

I do not suggest that every case of placenta prævia should be treated by Cæsarean section, but I do say that, when once the malposition of the placenta has been diagnosed, when the patient is not in labour or is only just beginning, and when the genital canal has not been infected, the treatment by Cæsarean section, in the hands of a man accustomed to abdominal work, and under those conditions now at our command in almost every town having a surgical clinique, is a very excellent method of dealing with one of the most serious emergencies which the accoucheur is called upon to face.



to-day that, when one attack of flooding has occurred, it is best to terminate the pregnancy.

Some years ago, a practitioner met me accidentally, and told me that he had a case of placenta prævia, in which there had been hæmorrhage which had stopped. He said, that if it recurred he would send for me. A week later it did recur, and he sent for me; when I arrived, she was almost *in extremis*, with a pulse of 160, and severe bleeding. The placenta was presenting and bulging into the vagina. I turned, left the breech plugging the lower uterine segment, and proceeded to transfuse her, but she sank and died quickly. I do not think anything could have saved her in that condition.

This case left on my mind a deep impression of the perilous condition of a patient, who has had one severe flooding due to placenta prævia. Now, I want to point out that this is just the sort of case in which Cæsarean section may help us to save mother and child, and I will give the details of a recent case, in which this treatment succeeded brilliantly.

A lady, aged 41, was sent to me by Dr. Edmondson, of Lancaster, early this year because she was pregnant, and had lost both her previous babies in childbirth, owing to pelvic contraction. She had a flat pelvis, and it was arranged that she should come to Leeds, early in July, for Cæsarean section. Towards the end of June, she came into lodgings in Leeds, and arrangements were made for her admission to a nursing home about July 15. On July 7 she sent for me, and I found that she had had a severe attack of spontaneous uterine hæmorrhage. There was a great deal of blood-clot in the bed, and the bleeding had not quite stopped. I decided to proceed to immediate operation. Unfortunately, the nursing home was absolutely full, and there was no time to lose. It was my operating day at the Infirmary, and everything was ready for an abdominal section in an hour's time. I sent for the Infirmary ambulance, and then and there conveyed her to the Infirmary myself, taking her straight to the operation-theatre. By Cæsarean section, I delivered a healthy living child. Then I peeled the placenta off the lower uterine segment with a gauze swab; it seemed to cover the os internum. The uterus retracted well, and hæmorrhage gave no trouble. She made an excellent recovery, suckled her child, and was discharged, cured, on July 25, returning later on to Lancaster.

This, then, was a case of placenta prævia treated by abdominal hysterotomy in as prompt and effective a manner as could be desired. Treatment by the vaginal route,

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SOME EXPERIENCES IN LOCAL ANÆSTHESIA.

By B. P. CAMPBELL, M.D., F.R.C.S.

Temp. Lieut. R.A.M.C.

THE object of the present paper is twofold: first, to set down my experience in a series of sixty-five cases operated on under local anæsthesia, and to point out the various conclusions formed; and, secondly, to give in full detail the technique employed in a number of the operations. Under the heading, "General Considerations," will be indicated the various points to which I think that importance should be attached, while, under that of "Technique," the exact procedure adopted in a number of the more frequently occurring operations will be described. Many, I believe, would adopt the use of local anæsthesia more freely, if they were not deterred from doing so by lack of confidence in their ability to obtain satisfactory results. I began employing local anæsthetics while in general practice, and found it most advantageous, for a large number of operations could be performed without being obliged to trouble my fellow practitioners to render assistance; with a small hospital, and the assistance of a competent nurse, I was able easily to perform a variety of operations. Since the outbreak of the war, I have had an opportunity for further investigation, and the present series refers to these latter cases. The series includes such varied operations as tonsillotomy; circumcision; straightening hammer toes; operations on tendons; the removal of foreign bodies, tumours, cysts, and bursæ; amputations of fingers and toes; radical operations for hallux valgus and hallux rigidus; the excision of internal hæmorrhoids and varicose veins, and radical operations for varicocele, hydrocele, and inguinal hernia.

GENERAL CONSIDERATIONS.

The anæsthetic employed was eudrenine; this preparation contains $\frac{1}{4}$ th grain of beta-eucaine hydrochloride and $\frac{1}{2000}$ th grain of adrenalin chloride in each cubic centimetre, being a

one per cent. solution of the anæsthetic agent. I always employ it, even in small operations, in the proportion of one part "eudrenine" and four parts normal saline solution. I find that, thus diluted, it gives perfectly satisfactory results, and, if necessary, can be injected safely in large quantity, up to six or seven ounces. A considerable quantity of the solution should be injected, for many fail through too sparing a use. I have never experienced any unfavourable results following the free use of this solution.

It is of the utmost importance previously to gain the confidence of the patient, and the best way to do so is to be perfectly frank with him. It is a mistake, especially with rather nervous patients, to say that there will be absolutely no pain or inconvenience, for, in most cases, the initial punctures and the process of injecting do cause a certain amount of pain, varying with the temperament of the patient, and if he is prepared for this beforehand, he will not be so likely to lose confidence. Patients should be warned that the initial process of injection is usually unpleasant and sometimes a little painful, but that, once this is accomplished, they need have little fear of suffering any pain during the operation. It is remarkable how comfortable the patient is during the operation compared with his attitude during the injection. With a nervous patient, it is an assistance if either the operator or someone else keeps up a conversation with him during the operation, for this distracts his mind from what is going on. If the patient is very nervous or the operation is likely to prove difficult, it is a great help to give him a hypodermic injection of $\frac{1}{8}$ th grain morphia and $\frac{1}{180}$ th grain atropine sulphate about an hour beforehand. Without doubt, gauging the patient's temperament and handling him accordingly are frequently the secret of success, and I believe that many failures are due to neglect of this precaution. Once the confidence of the patient is lost, the difficulties are enormously increased, although the actual injection may have been carried out satisfactorily.

That the patient can render considerable assistance is frequently a distinct advantage when operating under local anæsthesia. This is especially noticeable in operations for shortening or lengthening tendons, when the action of the

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operation, necessitating supplementary injections.

Although I have circum-injected fingers and toes with a relatively large quantity of diluted solution, I have not yet experienced any ill effects following the contraction of the blood vessels.

I have noticed that the anæsthetic action of the drug continues for a considerable time after the operation, and that patients only began to feel pain three or four hours later, and that the after-pain was no greater than that felt after operations in which a general anæsthetic was employed.

TECHNIQUE.

Before giving any description of individual operations, a few general questions with reference to needles, syringes, and their use, should be considered.

I use two syringes. The first is a small all-metal dental syringe with the finest needles, fitted with Schimmel mounts, for making initial skin wheals, and for all small operations in which a deep injection is not necessary and only four or five drachms of solution are required. The entrance of this very fine, sharp needle causes very little inconvenience or pain, although it may have to be inserted many times, owing to its short length and the small area which can be injected from each point of entrance. The second is an all-metal 10 c.c. syringe with a nozzle to take "slip on" needle mounts, such as the "Record." For longer needles, these are preferable to the "screw on" or Schimmel mounts, because the needle can easily be detached from the syringe without withdrawing it from the body. This is convenient when, from one point of entrance, three or four injections in different directions are required, because the needle need only be partly withdrawn and then re-inserted in any required direction, while the syringe is refilled with solution as often as is necessary. With this larger syringe, I use needles of three, four, or five inches in length, which are made of fairly thick steel tubing, and do not penetrate the skin very readily. The longer needles have considerable elasticity, and, unless handled carefully, are easily broken off where they join the mount. I prefer the points of the longer, thicker needles to have a short bevel rather than the usual

muscle can be demonstrated before and after performing the desired operation, and it is possible to see at once the result. Again, the patient can be placed in positions which might be inconvenient or unsafe were he under the influence of a general anæsthetic.

With regard to the question whether parts freely injected with a local anæsthetic are more liable to suppuration than those not so treated, it ought, according to my experience, to be answered in the negative, provided that every possible care is taken during the injection. Of course, the anæsthetic solution should be sterile, and the vessel containing it and all syringes and needles thoroughly boiled. The skin should be prepared previous to injection, and, after this has been carried out, it should receive a final cleansing and an application of iodine.

A local anæsthetic should never be injected in close proximity to inflamed or suppurating tissues, but at some little distance from the seat of inflammation. For example, the base of a finger can be circum-injected in a case of suppuration near the tip. It should be noted that, in cases of inflammation, the action of the drug is less reliable, and a longer period must be allowed for it to act before beginning the operation. In non-inflammatory cases, I have never been obliged to wait long after the injection, and have always found the part insensitve after the lapse of a few minutes.

Only sufficient diluted solution should be prepared for the day upon which it is required, for it does not seem to keep well, and, if an old solution is used, the result may prove unsatisfactory.

As a rule, it is unnecessary for the patient previously to undergo a special preparation, such as is required for a general anæsthetic.

When circum-injecting an area to be rendered anæsthetic, it is desirable to inject well beyond any part likely to be involved in the operation. This only implies the use of a slightly increased quantity of solution, but it allows a certain margin, should it later be found necessary to extend the operation area; whereas, if the part is circum-injected too closely, pain is frequently felt in the peripheral portion, and may give rise to inconvenience and delay during the

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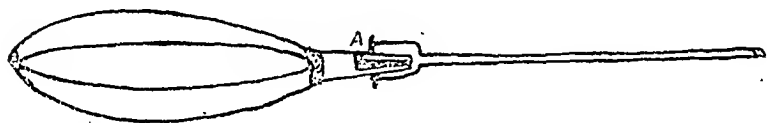


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Long Bevel

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Reference to the accompanying diagram shows that the nozzle is hollow, and has an aperture, A, in that portion above the level of the needle mount, the object being that, if the point of the needle enters an important blood vessel, blood will flow from this aperture, and the position of the needle can be altered before making any injection.

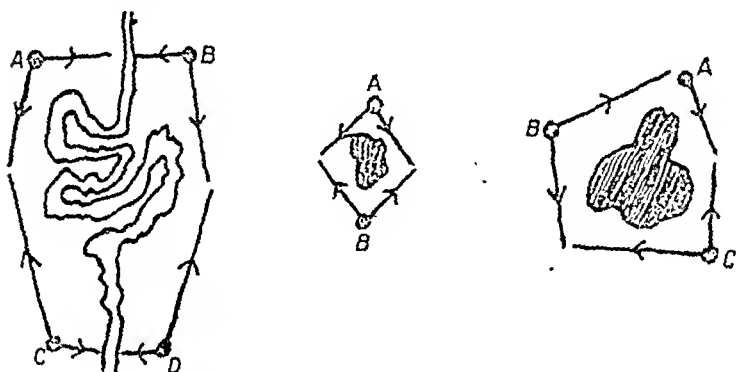
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It is important always to try to realize the exact position of the point of the needle in the tissues. After a little experience, this can be determined very accurately, and the

different layers that are pierced can be recognized.

I will now describe the technique in a number of individual operations.

When a circumscribed and fairly superficial area is the seat of operation, the indication is to shut it off from the surrounding parts by means of a subcutaneous anæsthetic wall, a little distance from the scene of operation.



The accompanying diagrams are self-explanatory, and represent the procedure better than words. In one, a mass of varicose veins is represented, and in the others, two objects requiring removal. The letters A, B, C, and D represent the points of entrance, and the arrows the direction of the subcutaneous injections. The points of entrance may be placed in any position convenient to the operator and the special requirements of the part under treatment. If a long needle is used, fewer points of entrance are required, but the number is of little consequence. The important point is that the subcutaneous tissues should be injected very freely in the line of the arrows, so as to form a complete anæsthetic ring round the part. Finally, from two or three of the points central injections are made under the object to be removed. This method is applicable to the removal of skin grafts, superficial foreign bodies, glands, tumours, cysts, bursæ, and varicose veins, and to operations on superficial tendons and similar operations. If the area to be occluded is small, four or five drachms of solution will suffice, and a small syringe with a fine needle can be employed; if it is large, as much as three ounces may be

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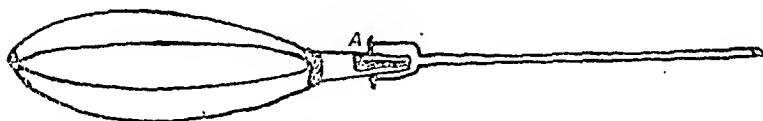


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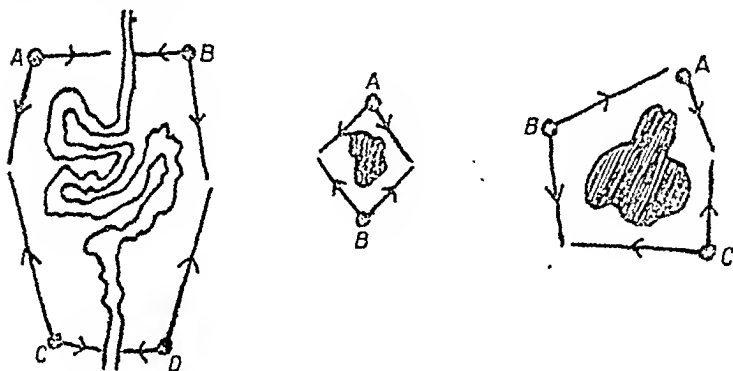
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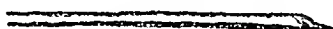


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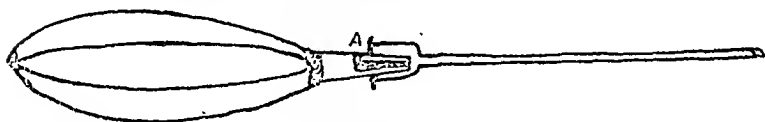


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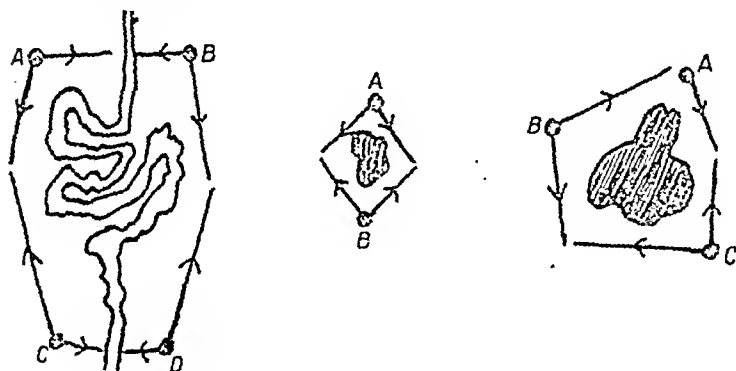
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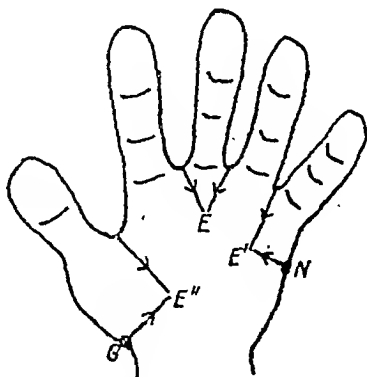
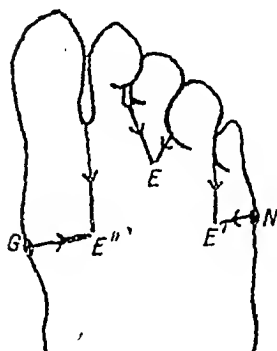
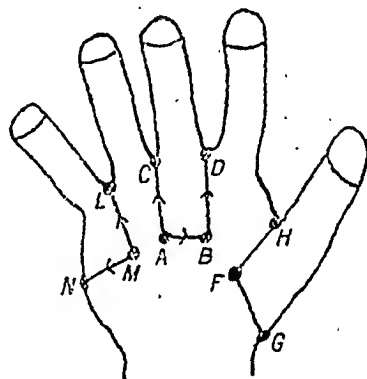
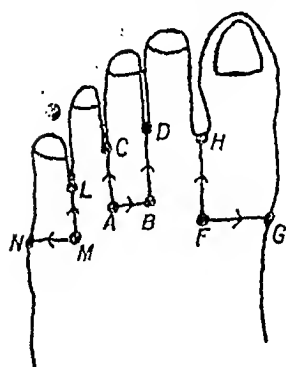


The accompanying diagrams are self-explanatory, and represent the procedure better than words. In one, a mass of varicose veins is represented, and in the others, two objects requiring removal. The letters A, B, C, and D represent the points of entrance, and the arrows the direction of the subcutaneous injections. The points of entrance may be placed in any position convenient to the operator and the special requirements of the part under treatment. If a long needle is used, fewer points of entrance are required, but the number is of little consequence. The important point is that the subcutaneous tissues should be injected very freely in the line of the arrows, so as to form a complete anæsthetic ring round the part. Finally, from two or three of the points central injections are made under the object to be removed. This method is applicable to the removal of skin grafts, superficial foreign bodies, glands, tumours, cysts, bursæ, and varicose veins, and to operations on superficial tendons and similar operations. If the area to be occluded is small, four or five drachms of solution will suffice, and a small syringe with a fine needle can be employed; if it is large, as much as three ounces may be

required, a long needle must be used; and skin wheals prepared at the proposed points of entrance. Long needles can easily be passed for several inches through the subcutaneous tissues parallel to the skin.

For operations on the hands and feet, I shall describe the technique applicable to the foot only, but it is exactly the same for the hand *mutatis mutandis*.

For operations on the distal phalanges of a toe, a simple circular injection of its base can be made from two points, C and D, on the dorsum at either side, and for this, less than two drachms will suffice.



For an operation on the second, third or fourth toes, such as straightening a hammer-toe or amputation at the metatarso-phalangeal joint, two points of entrance, A and B, are selected on the dorsum of the foot on either side of the metatarsal bone of the toe under consideration a short dis-

tance above the metatarso-phalangeal joint, and two other points, C and D, on either side of the web of the toe. From A and B, a needle is entered perpendicularly through the interosseous space until the point is felt under the skin of the sole, and an injection is made into the interosseous space on either side of the metatarsal bone as the needle is withdrawn. Subcutaneous injections are made between AB, AC, and BD. The neighbouring toes are then drawn aside and subcutaneous injections made from C and D through the web towards an imaginary point, E, in the sole. It is important that sufficient solution should be used in the deep interosseous injection, and that, in making the injections from C and D towards E, the web and plantar aspect of the base of the toe should be thoroughly infiltrated. For a toe, four or five drachms is the usual quantity, but, for a finger, three or four additional drachms are required.

The injection for removal of the little toe requires slight modification, for there is only the interosseous space between the fourth and fifth toe. The deep interosseous injection is made as before from the point, M, on the dorsum. The point, N, is taken on the edge of the foot on a level with M, and L is at the web of the little toe. Subcutaneous injections are made between ML and MN, and from L and N towards an imaginary point, E¹, in the sole opposite M.

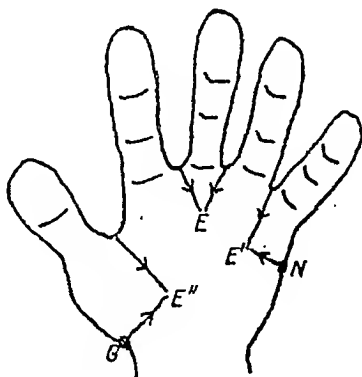
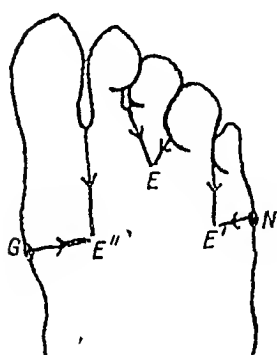
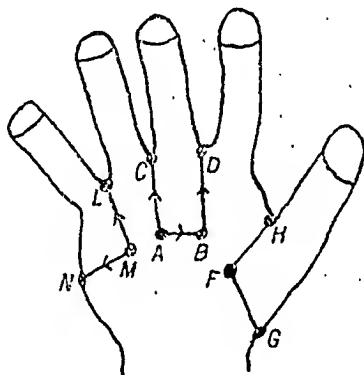
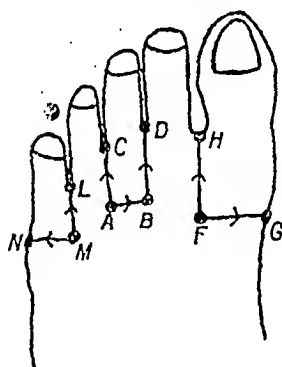
The points of injection, F, G, and H, for removal of the big toe or the radical operation for hallux valgus or hallux rigidus, are shown in the diagram. The interosseous injection is made at F, and G is on the edge of the foot. Nearly two ounces of solution are required for this injection.

I have successfully operated for varicocele after the following injection. A point of entrance is marked over the pubic bone, just to the inner side of the external abdominal ring, and two drachms of solution are injected into the inguinal canal through the ring. From this point a subcutaneous injection is made in the upper part of the scrotum, to include the area in which the skin incision is placed and the scrotal tissues are divided. The cord is identified through the wound, and a few drops of undiluted solution are injected direct into its upper part. The testicle and the cord below the external ring soon become insensitive, and, if gently handled, the enlarged veins can be

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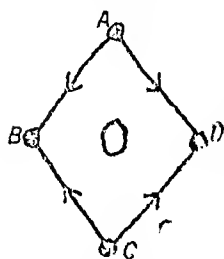
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removed.

When this method fails, or a more severe operation, such as the cure of a large hydrocele or the removal of a testicular growth is necessary, the entire penis and scrotum must be circum-injected as well from four or more points of entrance, one on either side at the spot where the cord crosses the pubic bone, and the others at convenient distances where the skin of the scrotum joins that of the inner side of the thighs. From the point over the pubic bone, two drachms are first injected into the cord, the point of the needle being made to touch the bone, and another two drachms into the inguinal canal through the ring. In most cases, the cord is easily identified between the finger and thumb at the site of injection. For a unilateral operation, it is only necessary to make this deep injection on one side, but both sides of the scrotum must be circum-injected. In making the injection round the penis and scrotum, two to three ounces of solution must be freely injected into the subcutaneous tissues in a line joining the points of entrance, and care must be taken that it does not enter the cavity of the scrotum.

The injection for the removal of internal hæmorrhoids has, in my experience, caused the patient more discomfort and pain than any other, but the injection once completed, the operation itself was painless. The patient is placed in the lithotomy position, and four points of entrance are prepared at A, B, C, and D, above, below, and on either side of the anus, and about an inch distant from it. From A, three deep injections are made before the needle is with-

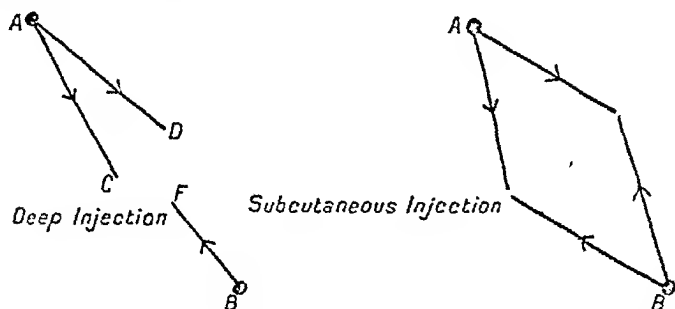


drawn, and, at each injection, nearly two drachms are used. The needle is entered first perpendicularly and passed deeply through the sphincter muscle parallel to the bowel; if desired, the point can be guided with a finger in the bowel. The other two injections are made through the sphincter obliquely towards B and D, so as to meet the deep oblique injections

from B and D towards A. After these deep injections have been carried out at each of the four points, the sphincter muscle and subcutaneous tissues are each circum-injected in the lines, AB, AD, and CB, CD, about half an ounce being

used for each injection.

The radical operation for inguinal hernia is easily performed under local anæsthesia, and about thirty drachms of solution are required.

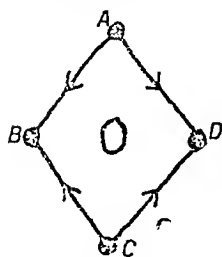


Skin wheals are prepared at two points of entrance—A, on a level with and three finger-breadths internal to the anterior-superior spine of the ilium, and B, over the pubic bone, just internal to the external abdominal ring. From A, the needle is entered perpendicularly through the skin, subcutaneous tissue and aponeurosis, and about two drachms of solution are injected deep into the muscular layer. This injection is twice repeated, but each time the point of the needle pierces the aponeurosis more obliquely towards the spine of the ilium until the third time it touches the iliac bone. It is very easy to recognize the resistance when the needle-point comes in contact with the aponeurosis, and it can often be heard piercing it. Six drachms of solution are used in this intra-muscular infiltration, which blocks the ilio-inguinal and ilio-hypogastric nerves. From A, two further injections of three drachms each are made in a V-shaped manner under the aponeurosis in the direction of the lines AC and AD on either side of the line AB. The needle is now transferred to B, entered perpendicularly to the pubic bone, and three drachms slowly injected as it is withdrawn. From B, a further three drachms are injected into the inguinal canal through the external abdominal ring in the line BF. Finally, from A and B, free subcutaneous injections are made in a V-shaped manner on either side of the line AB so as to enclose a quadrilateral skin area. If these injections are carried out as directed, a perfectly satisfactory

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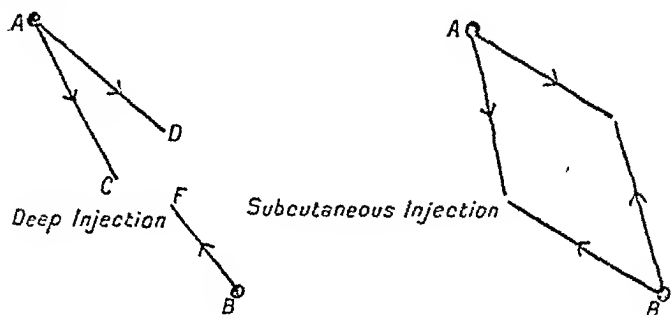


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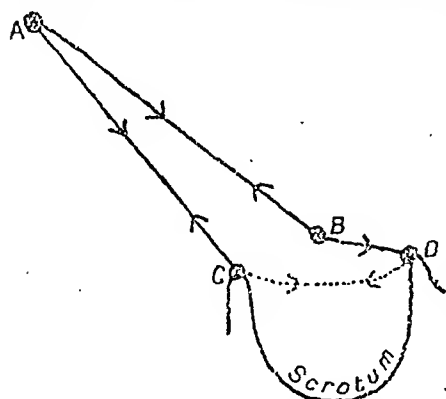
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anæsthesia will result.

For an irreducible scrotal hernia the presence of the swelling demands some modification. The point A is in its



former position, and all injections from it, deep and superficial, are made as before. B and C lie on either side of the neck of the sac, and, from both, deep injections of three drachms each are made to the pubic bone and into the inguinal canal along the neck of the sac, the swelling being drawn to

the opposite side while each injection is being made. Subcutaneous injections are made from B and C to meet those from A, and, finally, a subcutaneous circum-injection of the penis and scrotum is made in the manner already described. Five or more ounces of solution may be necessary for the complete injection.

In conclusion, I make no pretence at having made any new discoveries, but merely record my own experiences, which have been sufficiently successful for me to hope that they may be of some interest and assistance to those who may be tempted to use local anæsthetics more frequently in future. The technique followed is, to a considerable extent, that recommended by Braun, and some reference has been made to his excellent work on "Local Anæsthetics."



SOME OBSERVATIONS UPON THE ANATOMICAL RELATIONS OF THE OPTIC NERVES AND CHIASMA TO THE SPHENOID BONE.

BY G. F. C. WALLIS, M.D.

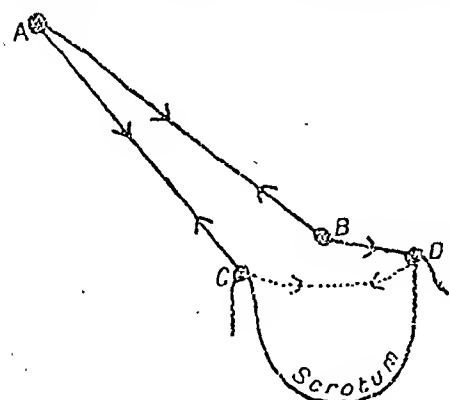
*Late Senior House Surgeon, Royal London Ophthalmic Hospital;
Bristol Eye Hospital, etc.*

THE correct appreciation of the anatomical relationships of the optic nerves and chiasma to the base of the skull has, during the past few years, become more widely accepted. Notwithstanding, at the present time, the traditional teaching that the optic chiasma occupies the optic groove of the sphenoid bone is believed by many clinicians, and is still to be found in some of the text-books of anatomy. This idea doubtless dies hard, because the bony groove in the sphenoid is called the optic sulcus. My attention was first drawn to this subject in 1907 when studying the ocular symptoms manifested in sphenoidal sinus disease. One such patient was seen with typical bi-temporal hemianopsia—a symptom that can only arise from some implication of the optic commissure—whilst the majority of patients showed only some contraction of the temporal field. Bi-temporal hemianopsia is a rare event in sinusitis, for I was, at that time, unable to find any other reported case, and, indeed, only somewhat conflicting accounts of the state of the visual fields. It is unnecessary for me to enter upon my observations on the effect of accessory sinus suppuration upon the visual fields, for they have been published in the *Journal of Rhinology and Otology* in 1909. I will merely remark that temporal contraction is commonly observed, because the nasal side of the optic nerve, owing to its contact with the lateral wall of the sphenoidal sinus whilst traversing the optic canal, is more affected by the local toxæmia.

Professor Onodi's monograph on the varying size, position, and relationships of the sphenoidal sinus shows clearly that parts of the bony walls of these cavities are often very thin or entirely deficient, and thus the optic nerves are more

anæsthesia will result.

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anterior edge of the commissure was measured from the limbus sphenoidalis (the sharp edge that passes across the body of the sphenoid between the posterior edges of the small wings), and whether the commissure lay entirely on the diaphragma and dorsum sellæ, on the body of the sphenoid, or partly on both.

(2) The antero-posterior width of the chiasma.

(3) The lateral width.

(4) The length of the intra-cranial portion of the optic nerves, as measured from the posterior lip of the small wing of the sphenoid to the juncture of the two nerves to form the chiasma.

(5) The diameter of the optic nerves.

(6) The shape at the juncture of the two nerves at the chiasma.

(7) The antero-posterior diameter of the table of bone between the limbus sphenoidalis and the olivary eminence.

(8) The antero-posterior width of the fossa pituitaris measured from the olivary eminence to the anterior lip of the dorsum sellæ; this was done after the chiasma and nerves had been removed.

(9) The length of the optic canals was determined by chiselling away the bony roof of the orbit, and then removing the fat and other contents of the posterior part of the orbit so as to expose the orbital part of the nerve. A narrow track was then cut through the bony roof of the optic canal, by which means a good view of the nerve *in situ* could be obtained.

(10) The extent of the sphenoidal sinus was seen by removing the roof of the cavity.

(11) Presence or absence of pus in that cavity.

A careful perusal of the following table, in which all the measurements are given, will show how great the variations are. As the examinations are but few in number, I mention below only the greatest and smallest measurements.

I. *Position of the Chiasma.*—In only the eleventh body examined, and the ninth in which measurements were made, was the chiasma alone approaching the more generally accepted position; in this subject, a female aged 93, rather more than one-half of the chiasma rested

readily involved by any toxins. As already stated, a temporal contraction of the visual fields in sphenoidal sinusitis is common; but if the optic chiasma lay in the optic groove in close relationship to the sphenoidal sinus the problem to solve was to explain the rarity of bi-temporal hemianopsia in disease of the sinus. T. W. P. Lawrence published a short article in the *Journal of Anatomy and Physiology*, 1894, wherein he showed that the chiasma lay over the pituitary fossa, and probably never occupied the optic sulcus. This observation was later worked upon by Zander,¹ but, for long, little attention was paid to the importance of this point. J. H. Fisher, who has closely studied diseases of the pituitary body, in his address on Leber's disease at the Ophthalmological Congress of the United Kingdom (1916), expressed the same view as Lawrence. Now, if the optic chiasma always lay entirely posterior to the olivary eminence, and therefore not in relationship to the sphenoidal sinus, how, then, could a bi-temporal hemianopsia ever result from disease of the sphenoidal sinus was the next problem that presented. In this dilemma, Professor Walker Hall very kindly allowed me the facilities to examine the brain and cranial cavities in the post-mortem room of the Bristol Royal Infirmary. In the course of three months, I was thus enabled to investigate the anatomy of this region in some eleven subjects. Only bodies were used in which the brain did not form a chief part of the post-mortem enquiry, for I followed the plan of Lawrence in removing the cranial contents piecemeal in order, as the chiasma adheres to the under surface of the floor of the third ventricle, to avoid disturbing the relationship of the parts. These observations are published now, because they largely support the view of Lawrence, and certain other points are elucidated.

At the first few post-mortems, I was much struck by the variations that presented in the parts on close inspection. Accordingly, in all subsequent examinations, of which there were nine, I recorded careful measurements and observations of the following, in the order given:—

(1) The position of the chiasma; the distance of the

¹ I believe Zander enunciated somewhat similar views to those expressed in this paper, but I have not been able to peruse his article.

anterior edge of the commissure was measured from the limbus sphenoidalis (the sharp edge that passes across the body of the sphenoid between the posterior edges of the small wings), and whether the commissure lay entirely on the diaphragma and dorsum sellæ, on the body of the sphenoid, or partly on both.

(2) The antero-posterior width of the chiasma.

(3) The lateral width.

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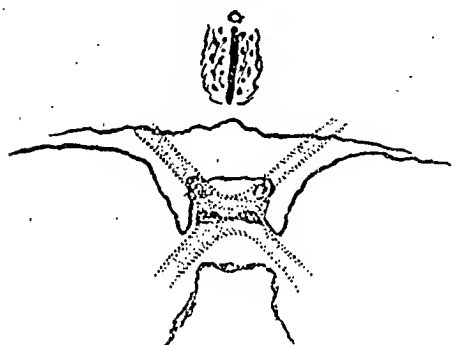
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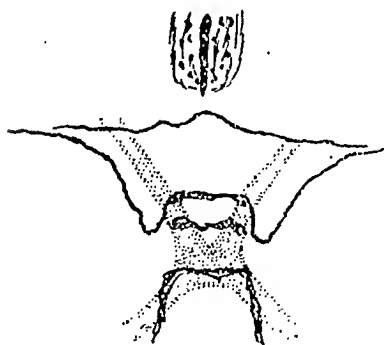
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upon the optic sulcus and the olivary eminence. In this particular instance, the antero-posterior dimension of the chiasma was 9 mm., and the posterior half of it rested upon the pituitary body, *vide* Diag. 1. In one other, the chiasma reached just sufficiently far forward to be in contact with the olivary



1. Diagram to show chiasma lying far forward on table of bone as in subject 9. Bow-shaped junction of optic nerves, which are short. This situation of the chiasma is only occasional.

eminence. All the others varied from as little as 1 mm. to as much as 5 mm. posterior to the olivary processes, the usual being about 3 mm.; thus, in these, it rested entirely upon the pituitary body and partly upon the dorsum sellæ in addition, *vide* Diag. 2. One of the subjects investigated was a child aged 4, in whom the chiasma lay 3 mm. wholly pos-



2. Diagram to show chiasma situated far back and the acute junction of the optic nerves to form chiasma. Note in this, the more usual position, the chiasma lies partly above the dorsum sellæ; also the long optic nerves.

terior to the olivary eminence; in a formalin hardened body, a like condition was found. According to these findings, neither the usually accepted position nor the view of Lawrence is entirely correct, and we may sum up and say that, whilst the chiasma does occasionally rest on the optic sulcus, it is

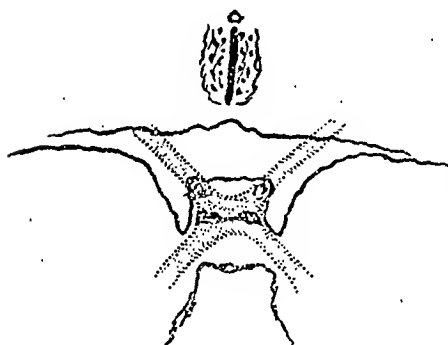
nearly always completely posterior to it.¹

2 and 3. *Antero-Posterior and Lateral Diameter of the Chiasma.*—The smallest antero-posterior dimension was 7 mm. and the greatest was 11 mm.; the lateral is usually about 3 mm. greater than the antero-posterior. J. H. Fisher gives the lateral diameter as $\frac{3}{8}$ in. These dimensions vary according as this structure is flattened from above downward or more rounded, and we shall see the same is the case with the intra-cranial portions of the optic nerves. In the formalin-hardened body examined, these structures were very flattened. With the cadaver in the supine position there can hardly be any pressure upon the chiasma or nerves, and, therefore, it is probable that this is a natural, and not an artificial, condition. It follows, from the large dimensions of the chiasma, that in those subjects in which this structure is situated sufficiently far forward only a small portion could rest upon the optic sulcus, for, when this groove and olivary eminence are averagely developed, it is only about 5 mm. or less across.

4. *Length of the intra-cranial portion of Optic Nerve.*—These were measured from the superior lip, bony or membranous, as the case might be, of the optic canal to the mesial aspect of the junction with the chiasma, and on the two sides were within 1 mm. of the same length as the other. In different adult subjects one pair was as short as 7 mm. and another as long as 12 mm. Comparing these figures (column 4) with those in column 9 (length of the optic canal) and column 7 (diameter of limbus to olivary eminence), one does not find, as one might possibly expect, a long intra-cranial nerve in association with a short optic canal, or a long intra-cranial nerve and a large dimension between the olivary eminence and limbus sphenoidalis. There is, however, an apparent relation between the size of the pituitary fossa and the length of the intra-cranial optic nerve (compare columns 8 and 4), short nerves being associated with small fossæ (*i.e.*, short antero-posterior diameter to the fossa) and *vice versa*. If this were so, it would have a direct bearing on the position of the chiasma.

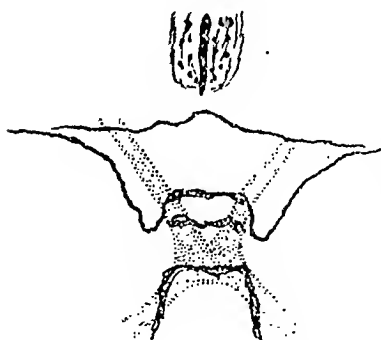
¹ H. M. Traquair, in a recent personal communication, states the relationship as follows:—"The chiasma lies above the posterior half of the sella Turcica as a rule, but the position varies slightly."

upon the optic sulcus and the olivary eminence. In this particular instance, the antero-posterior dimension of the chiasma was 9 mm., and the posterior half of it rested upon the pituitary body, *vide* Diag. 1. In one other, the chiasma reached just sufficiently far forward to be in contact with the olivary



1. Diagram to show chiasma lying far forward on table of bone as in subject 9. Bow-shaped junction of optic nerves, which are short. This situation of the chiasma is only occasional.

eminence. All the others varied from as little as 1 mm. to as much as 5 mm. posterior to the olivary processes, the usual being about 3 mm.; thus, in these, it rested entirely upon the pituitary body and partly upon the dorsum sellæ in addition, *vide* Diag. 2. One of the subjects investigated was a child aged 4, in whom the chiasma lay 3 mm. wholly pos-



2. Diagram to show chiasma situated far back and the acute junction of the optic nerves to form chiasma. Note in this, the more usual position, the chiasma lies partly above the dorsum sellæ; also the long optic nerves.

terior to the olivary eminence; in a formalin hardened body, a like condition was found. According to these findings, neither the usually accepted position nor the view of Lawrence is entirely correct, and we may sum up and say that, whilst the chiasma does occasionally rest on the optic sulcus, it is

rested upon the olivary eminence. This area of bone between the olivary eminence and the limbus may be practically non-existent, and then the curve of the pituitary fossa runs up almost continuously with the optic canals—in one dried specimen I have, the olivary eminence is a slight projection upon this continuous fossa—or it may be as much as 9 mm. in extent. More usually it is 3 to 5 mm. Cunningham in his text-book of anatomy, quoting Lawrence, says, "This groove (the optic) is liable to considerable variations, and apparently does not always serve for lodgement of the optic chiasma." Lawrence shows that the extent of this table of bone and the optic groove depends upon the development attained by the pre-sphenoid and orbito-sphenoid parts of the sphenoid bone. In Gray's anatomy, it is interesting to note in passing that the optic sulcus is called the "chiasmatic groove," but the chiasma is stated to lie above and behind this.

8. *Antero-posterior measurement of the Fossa Pituitaris.*—This diameter, which was measured from the olivary eminence to the centre of the dorsum sellæ, varied not only on account of the size of the fossa, but also with the projection forwards of the dorsum sellæ and its posterior clinoid processes. Hence it comes to be that whilst a large diameter, such as 11·5 mm. recorded above, means a large fossa, a smaller measurement of 5·5 mm. does not necessarily mean a small fossa, because the cavity for the gland varies a good deal in depth. Owing to the variations in the table of bone in front of the pituitary body, the contour and extent of the pituitary fossa, the greater or less projection of the clinoid processes, the length of the optic nerves, and the form of the chiasma and nerves, this part of the base of the skull presents considerable differences to inspection.

9. *Length of the Optic Canals.*—Reference to a few dried skulls will show that the optic nerve may leave the cranial cavity and enter the orbit almost at once, as by a simple foramen, and, in fact, it is usually termed a foramen. On the other hand, there may be a considerable length of optic nerve contained in a cylindrical canal. Sometimes the posterior-superior lip is composed of dura, and occasionally the whole roof is membranous. It is difficult to measure, because the superior, mesial, inferior

It is possible that the length of nerve varies with the type of skull—brachycephalic and dolichocephalic—but I have no measurements.

5. *Diameter of the intra-cranial portion of the Optic Nerve.*—The cross-sectional diameter is commonly about 4.5 mm., but varies from a little less than this to as great as 7 mm., according to the form of the chiasma.

6. *Form of the junction of the two nerves at the Chiasma.*—Accordingly, as we find the chiasma situated far back over the pituitary body or dorsum sellæ, these two nerves join at an acute angle, and the further this junction takes place from the limbus the sharper is this angle. Whilst, when the commissure is situated more forward or is over the optic groove, it is U-shaped or even like a bent bow. Such naturally follows upon the length of the intra-cranial nerves, and, to a less extent, upon the width of the body of the sphenoid.

7. *Antero-posterior width of the table of bone in front of the Pituitary Fossa.*—On this is seen the optic groove and the olivary eminence, and this portion of bone roofs in the

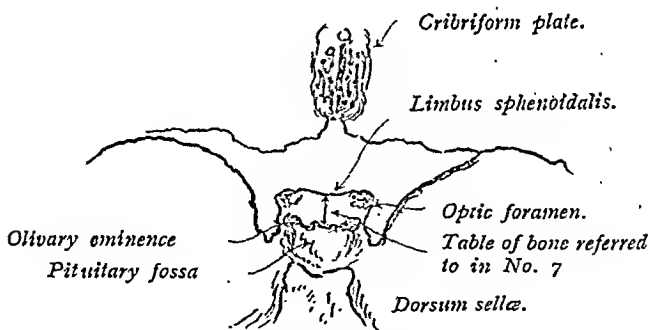


Diagram to show the table of bone between the olivary eminence and the limbus sphenoidalis.

sphenoidal sinus, when it extends to this limit posteriorly, as is commonly the case. It is, therefore, the part of the sphenoidal sinus with which the optic chiasma may be in contact. In the eleventh post-mortem examination, the chiasma overlapped this table of bone to the extent of 5 mm., and, in one other subject, the anterior edge of the chiasma just

rested upon the olivary eminence. This area of bone between the olivary eminence and the limbus may be practically non-existent, and then the curve of the pituitary fossa runs up almost continuously with the optic canals—in one dried specimen I have, the olivary eminence is a slight projection upon this continuous fossa—or it may be as much as 9 mm. in extent. More usually it is 3 to 5 mm. Cunningham in his text-book of anatomy, quoting Lawrence, says, "This groove (the optic) is liable to considerable variations, and apparently does not always serve for lodgement of the optic chiasma." Lawrence shows that the extent of this table of bone and the optic groove depends upon the development attained by the pre-sphenoid and orbito-sphenoid parts of the sphenoid bone. In Gray's anatomy, it is interesting to note in passing that the optic sulcus is called the "chiasmatic groove," but the chiasma is stated to lie above and behind this.

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TABLE OF

Subject.	I. Position of Chiasma.	2 and 3.		4.	
		Dimensions of Chiasma.		Length of Intra- Cranial Portions of Optic Nerves.	
		Antero- pos- terior.	Lateral.	Right.	Left.
1. Male, age 36.	Anterior edge, 9 mm. behind limbus; 4 mm. behind olivary eminence. Posterior edge barely reached to dorsum sellæ.	6 mm.	12 mm.	11 mm.	11 mm.
2. Male, age 45; general peritonitis.	Anterior edge, 10 mm. behind limbus; 4 mm. behind olivary eminence. Posterior edge extends over dorsum sellæ.	11 mm.	14 mm.	11 mm.	10 mm.
3. Female, age 36; tetanus.	Anterior edge, 6 mm. behind limbus; 1 mm. behind olivary eminence. Posterior edge extends over dorsum sellæ.	9 mm.	12 mm.	10 mm.	10 mm.
4. Child, age 4; broncho-pneumonia.	3 mm. behind olivary eminence.	These measurements are not given, compare with those in			
5. Male, age 50; hepatic carcinoma.	Anterior edge, 6 mm. behind limbus; rested on olivary eminence. Posterior edge just extends to dorsum sellæ.	9 mm.	12 mm.	9 mm.	9 mm.
6. Male, age 63; suicide.	Anterior edge, 9 mm. behind limbus; 4 mm. behind olivary eminence. Posterior edge extends well over dorsum sellæ.	9 mm.	11 mm.	11 mm.	11 mm.

MEASUREMENTS.

5.		6.	7.	8.	9.	
Diameter of Optic Nerves.					Length of the Optic Canals.	
Right.	Left.	Shape of Junction of Nerves at Chiasma.	Dimensions of Table of Bone between Limbus and Olivary Eminence of Sphenoid Bone.	Antero-posterior Width of Pituitary Fossa.		Right.
3.5 mm.	3.5 mm.	Blunt-angled "V."	5 mm.	10 mm.	10 mm.	7 mm.
6 mm.	5 mm.	Acute angled "V."	6 mm.	11 mm.	4 mm.	4 mm.
4 mm.	4 mm.	Acute-angled "V."	5 mm.	6 mm.	2 mm.	2 mm.
as they will not an adult.		Acute-angled "V."	—	—	—	—
3.5 mm.	3.5 mm.	"U" shaped	8 mm.	8 mm.	13 mm.	13 mm.
7 mm.	7 mm.	Acute-angled "V."	5 mm.	9 mm.	11 mm.	10 mm.

TABLE OF

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MEASUREMENTS.

5.		6.	7.	8.	9.	
Diameter of Optic Nerves.					Shape of Junction of Nerves at Chiasma.	Antero-posterior Width of Pituitary Fossa.
Right.	Left.		Dimensions of Table of Bone between Limbus and Olivary Eminence of Sphenoid Bone.		Right.	Left.
5 mm.	4.5 mm.	Wide-angled "U."	4 mm.	7 mm.	11 mm.	10 mm.
4.5 mm.	5 mm.	"U" shaped	4 mm.	9 mm.	7 mm.	9 mm.
3.5 mm.	3.5 mm.	Bent bow	9 mm.	5 mm.	4 mm.	9 mm.
order to see the position of the chiasma in a formalin body.						

that has received ample investigation by different observers, and is of little importance to this enquiry. It suffices to say in these post-mortem subjects there were no departures from the normal variations—the majority extended posteriorly to the pituitary fossa or beneath it, and in one far back into the dorsum sellæ. Such an extensive cavity was seen in the subject where the chiasma rested upon the optic sulcus, and, therefore, the chiasma was in relation to the sphenoidal sinus in this instance.

II. *Condition of the Sinus.*—These notes were made to determine the frequency with which suppurative conditions of

TABLE OF

Subject.	1. Position of Chiasma.	2 and 3.		4.	
		Dimensions of Chiasma.		Length of Intra- Cranial Portions of Optic Nerves.	
		Antero- pos- terior.	Lateral.	Right.	Left.
7. Female, age 55; gangrene.	Anterior edge, 5 mm. behind limbus; 1 mm. behind olivary eminence. Posterior edge just extends to dorsum sellæ.	7 mm.	12 mm.	7 mm.	7 mm.
8. Female, age 63; volvulus.	Anterior edge, 9 mm. behind limbus; 5 mm. behind olivary eminence. Posterior edge extends well over dorsum.	10 mm.	11 mm.	12 mm.	11 mm.
9. Female, age 93; fractured femur.	Anterior edge, 4 mm. behind limbus; anterior 5 mm. of chiasma rested on olivary eminence and optic sulcus.	9 mm.	12 mm.	9 mm.	9 mm.
10. Anatomy room; for- malin har- dened.	Anterior edge, 4 mm. behind olivary eminence.	This subject was examined in hardened			

and lateral walls are not of the same length, and because it is not always easy to determine the limit at which the canal or foramen widens out into the orbit. I measured the superior aspect as being the more readily ascertained. Usually the outer side is the shorter, but the inner side is the more important, being formed by the outer wall of the sphenoidal sinus and posterior ethmoid cells. Onodi figures, in his book, the nerve in its canal passing through the centre of the sphenoidal sinus, owing to this air cell having excavated into the lesser wings of the sphenoid.

10. *Extent of the Sphenoid Sinus.*—This is a subject

ULTRA-VIOLET LIGHT IN MEDICINE AND SURGERY.

By F. SWANSON HAWKS, (TEMP. CAPT.) R.A.M.C.

Medical Officer in Charge, Medical Radiographic and Electrotherapeutic Departments, Connaught Hospital, Aldershot.

THE science of phototherapy is very modern, although man has, from the earliest days, instinctively recognized the beneficial effects of sunlight. As far back as 1877, the bactericidal effect of light was studied, and it was discovered that the most refrangible rays were the most active in this respect. Since then much research work has been carried out, which it is out of place to attempt to review in a paper of this nature.

The event which stands out as epoch-marking is the application by Finsen of light in the cure of lupus vulgaris.

Finsen knew, from earlier work, that the most active rays were the most refrangible, that is to say, the waves of shortest wave-length at the violet end of the spectrum. He soon found, too, that sunlight which reaches sea-level is very deficient in just such rays, owing to the "filtration" effect of the atmosphere. The beneficial effects of mountain air are well known,¹ and are due to the presence of a larger proportion of short wave-length rays at such altitudes, owing to rarefaction, lower pressure, and the absence of suspended "material particles" in the atmosphere.

On the other hand, the profession is only too well acquainted with the reverse picture among town-dwellers in atmospheres so charged with dust that sunlight is bereft of its more salutary elements, and the inhabitants are deprived of their chief ally in their struggle with disease and death. Moreover, the intensity of sunlight is never constant, so that Finsen soon turned to the study and application of "Artificial Sunlight." Here, again, it would be highly interesting and instructive to follow the evolution in the manufacture of appliances for producing artificial sunlight. One must be

¹ Amply demonstrated at Leysin (Switzerland); altitude, 4,500 ft

the sinus occurred without giving rise to symptoms in life. As the healthiness, or otherwise, of the sinus does not enter into this discussion, the details need not detain us.

Conclusion.—These observations, by no means as perfect as I could wish, because further opportunities of post-mortem investigation have not occurred, will serve to draw attention again to this part, and to support the investigations of others. They show the bearing of sphenoidal sinusitis on affections of the optic nerves and chiasma with the consequent field involvement. Also, if the chiasma chanced to be situated almost wholly in front of the pituitary body when that organ is diseased, it may possibly explain those cases where the symptom of bi-temporal hemianopsia is absent, for tumours of the pituitary body more commonly grow backwards and erode the dorsum sellæ than the anterior part of the fossa (Fisher).

here during eighteen months has yielded to this treatment, and, during the same period, uniformly successful results have been obtained in the skin cases, of which the daily average attendance is between thirty and forty.

This does not exhaust its possibilities in the hands of the dermatologist, or the general practitioner, in dealing with skin affections. I need only mention chilblains, which are very amenable.

A class of case, which is, perhaps, of more particular interest just now, is that of open wounds. The rapid healing of granulating surfaces is remarkable; the first application has a noticeable effect, and, when sepsis is present to any degree, the value of this treatment is very great. One notices with pleasure the almost instant response of sluggish ulcers, *e.g.*, varicose ulcers, chancres with mixed infections, which refuse to heal, or gummatous ulcers, sloughy buboes, and other glandular suppurations.

Ultra-violet light has proved most useful in dealing with those head injuries with lacerated wounds, which are so difficult to clean and to *keep* clean. It is useful, too, in maintaining the health of a skin-graft and promoting its rapid growth, and there seems to be every indication for its extensive use in what is termed "plastic surgery." This automatic disinfection of wounds and simultaneous promotion of healthy repair tissue should commend it to the surgeon.

Even the most serious and extensive wounds will heal more rapidly, wound fever is counteracted, and gangrenous foetid wounds rapidly become inodorous. The light has a definite action in helping to clear up scar tissue, more particularly if resorted to early; in fact, it is my opinion that it tends to prevent the formation of what is commonly called scar tissue, so that the ultimate result is even nearer the normal than would otherwise have been the case.

To those acquainted with the excellent work of Lord Mayor Treloar's Cripple Home at Alton, the light requires no recommendation for surgical tuberculosis. Apart from its surgical aspects, it has important effects in other forms of tuberculosis, and this is only what one would expect, bearing in mind the relationship of sunlight to this disease. Whole-body baths in ultra-violet light produce a sense of

content to say that it is only within recent years that the problem has been reduced to the realm of the practical.

Owing to these technical difficulties, the therapeutic uses of light remained a matter of laboratory demonstration rather than of clinical experience. Meanwhile, a considerable, but sporadic, literature has accumulated, but almost entirely on the Continent. Concurrently with medical research into the therapeutic uses of light, a great, probably greater, interest has been displayed in ultra-violet light in the domains of physics, chemistry, biochemistry, and photochemistry, and the purpose of this paper is to bring together certain facts, and to claim for ultra-violet light, now that technical difficulties have been overcome, a very definite place in therapeutics.

From the rapidly accumulating data, in the various sciences mentioned above, certain important facts emerge, and we can say that ultra-violet light—

1. Possesses direct bactericidal action,¹ which is independent of temperature;
2. Possesses decided oxidation effects, generating H_2O_2 , ozone, and nascent oxygen (by ionization) in tissues exposed to it;
3. Definitely increases metabolism, both local and general, and therefore promotes growth and repair of tissues;
4. Produces immediate physiological effects, not so easily explained, but which suggest profound reflex action, probably by stimulation of peripheral nerves.

PRACTICAL THERAPEUTICS.

Bearing in mind these last enumerated facts, we can readily understand some of the practical applications and results, and, without further elaboration, we may record results which have been attained.

Many forms of skin disease react readily, particularly lupus, sycosis, alopecia areata, acne vulgaris and rosacea, and certain forms of rodent ulcer, nævus, eczema and psoriasis, with selection and careful treatment.

Every ulcerated surface which has come under treatment

¹ *Vide* report by Dr. Roux, Director of Pasteur Institute at the Academy of Sciences, Paris, December 27, 1909.

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"well-being," improve digestion and appetite, relieve insomnia, and, in fact, have a general tonic effect, including mental stimulation. They are, therefore, indicated in many conditions associated with debility and general exhaustion, pre-eminently tuberculosis, but also anæmia, chlorosis, amenorrhœa, etc., not omitting that group of unclassified conditions which, because of our imperfect knowledge, we call neurasthenia.

Owing to its production of vaso-dilatation and an accompanying reduction in blood-pressure, an effect which is of some duration,¹ it is useful in many cardio-vascular diseases, including angina pectoris. As arterial tension is certainly reduced, the use of this agent in certain kidney and liver conditions may be suggested, but the writer has not sufficient experience in these cases to make any definite statement.

Locally, it relieves gouty, rheumatic, and other muscular pains, so much so that I always combine it with whatever other remedial measure I undertake in this large class of case, amongst men who, through exposure and hardship, come complaining of "rheumatism," whether lumbago, sciatica, pleurodynia, or other myalgias.

The treatment is useful too in some of those obscure abdominal and pelvic pains to which it is difficult to give a name, but which are, none the less, a cause of disability. From the literature on the subject, I gather that it is of use in gynæcology, but here I cannot speak from any practical experience, although, from what I have already put forward, many of the indications are apparent. "Conditions associated with the catamenia, such as pain in the loins, excessive menstruation, and leucorrhœa, are amenable to this treatment. By radiation of abdomen, loins and cervix, vaginal catarrh and erosions of the cervix, which proved refractory with every other form of treatment, healed readily, leaving the cervical epithelium hardened."

The following notes are included as an indication of the types dealt with and of the methods adopted.

¹ *Le Radium*, April, 1906, summarizing the work of Hasselbach at the Finsen Institute of Copenhagen, says that after two or three irradiations the blood-pressure is reduced as much as 8 per cent., and this reduction persists for as long as a month.

CASES.

1.—Driver H., A.S.C. Twelve months ago contracted sycosis. Nine months ago enlisted; within one month "reported sick," as sycosis was much worse. Six weeks' "ointment treatment," much improved; been attending doctor on and off ever since. When first seen here, both sides of face and chin badly infected; chin was a messy granulomatous surface. All crusts were removed with pure cresol, and each side was then irradiated daily; distance, twelve inches; exposure time, 60 secs. Complete cure in fifteen days.

N.B.—It is essential to remove all scabs, crusts, discharge, etc., before irradiation, so that the light may reach the affected area directly, so far as is possible.

2.—Mrs. B. Aged 72 years. Lupus with erosion of nose. Complaint started "many years" ago; has had X-rays, Finsen light, and "many other treatments." Exposure time varied from two to three minutes; distance, eighteen inches. In fourteen days, one side of face clear, other clearing rapidly. Ill and unable to attend, and subsequently died from intercurrent malady, said to be "bronchitis."

3.—Baby. Infantile eczema. Brief exposures of about two minutes, passing the lamp by hand back and forward at a distance of eighteen inches. Cleared within one month.

4.—Pte. A., Welsh Regiment. Eczema four years. Both arms below the elbow badly affected. Left arm was treated at first, so that a comparison might be made. Within a week decided improvement was noticed, and within a month this arm was very much better. Treatment was then begun with other arm and still continuing (six weeks); exposure time, two minutes. Distance, twelve inches. This case has resisted every former treatment.

5.—Trooper W., D.G. Syphilis eleven years ago. Three weeks previous kicked by horse; ten days later swelling appeared at inner end of right clavicle, which rapidly broke down, leaving dirty ulcer, with erosion of sternum. Venereal specialists diagnosed gumma, and 606 was given twice without result.

When first seen, the ulcer was size of five shilling piece, sloughy and most unhealthy in appearance. Irradiation daily for two minutes at twelve inches. After six applications, size was about the same, but ulcer looked very healthy, and was completely healed over in three weeks. Irradiation was continued for ten days to secure a healthy scar. Discharged to unit, and no recurrence.

6.—Mr. M. Varicose ulcer on left leg, shaped like figure of 8, upper loop size of half-a-crown, lower loop somewhat smaller; two and a half minutes' exposure at twelve inches. After second dose, margins were healthy and slough had cleared. Healed over in eight applications, spread over fifteen days. No recurrence within six months, after which no history.

7.—Pte. H., aged 23 years. Indolent suppurating glands in the right groin, not venereal, but probably due to dirt and chafing.

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further cases.

TECHNIQUE.

Those acquainted with current literature are aware that there has been considerable discussion with reference to the subject of "radiations" in general, and various forms of ultra-violet light apparatus in particular. If I write dogmatically, it is not because I wish to set aside discussion, which I think is excellent and helpful, but because I am endeavouring to write a practical article for practical men. I am, however, bound, for this very reason, to say that the publication of articles on the physics of this light, *e.g.*, comparative spectrum analysis of its various sources, are apt to be misleading unless *all the conditions of production are stated*. The importance of this will be seen later. Moreover, we are bound to deal with the subject, not from the *laboratory* point of view, important and helpful as this undoubtedly is, but from the practical point of view, bearing in mind general utility, initial cost, expenses of maintenance, and simplicity.

Of all the sources of the light at present available, the writer prefers the mercury vapour arc lamp, because it complies with all the above conditions, and requires no technical knowledge to operate, provided it is consistently used. I use a quartz lamp made by Westinghouse (Cooper Hewitt) Co. It consists of a short quartz tube, which contains the arc. The mercury arc is very rich in ultra-violet output, and the quartz allows nearly all the short wave-lengths to pass. It is *essential* to maintain optimum conditions of temperature, voltage, and amperage, in accordance with the manufacturer's instructions, if consistent results are to be obtained; given those conditions, dosage is standardized, for the arc is continuous, which cannot be said for carbon or other metallic arcs as at present used. Moreover, it is the most economical in current consumption, and the simplest to use.

DOSAGE.

My own lamp is a 200-volt continuous current lamp of the type known to the manufacturer as Y 2 burner. It is larger than the burner fitted to their "medical lamp"; the time of exposure is, therefore, shorter (an important

Opened and scraped three months ago, but refused to heal, despite every effort. Completely healed after seven days. Exposure for two and a half to three minutes at twelve inches. Discharged to regiment.

N.B.—In all the cases of local application, the surrounding parts are protected by lint, and the patient protects his eyes with any convenient article.

8.—Pte. F. Shrapnel wound, right elbow practically blown away. Very septic on admission, with gaping wound four inches across. Looked clean after second dose of two minutes at twelve inches. Made steady progress, and, despite three operations for removal of dead bone, was completely healed in two months, with slight scarring.

9.—Rifleman B. Gunshot wound front of right wrist two inches long, flexor tendons exposed, very septic and much pus. After five applications, dried up and looked healthy. After ten applications, size half-inch. After twenty applications, healed, with perfect movement and fit for active service.

10.—Corp. S., R.E. Aged 37 years. Septic hand, numerous incisions on back of hand and wrist; all healed, except one, when he came under treatment. Movement much impaired, only very slight flexion and extension possible. Scars did not seem to give under chlorine ionization, so lamp was used in addition. Softening began almost at once, and the man returned to duty in just over six weeks, with a perfectly useful hand.

11.—Civilian. Aged 28 years. Dragged under a motor-car for some yards. Left ear torn off and all left side of head was one large lacerated wound, showing pericranium in places. Wound very dirty and extremely difficult to clean effectually. Light treatment was adopted from the start, and was given daily. Within eight days there was no pus, and the whole wound looked beautifully healthy. Continued to granulate over, and in twenty days the wound was reduced to the size of four inches square, when he was discharged to a civil hospital.

12.—Capt. C., Royal Scots Fusiliers. Compound fracture of femur twelve months ago. Bad puckered scars, with complete loss of flexion at knee joint owing to adhesions. Chlorine ionization and ultra-violet light daily. Scar gradually softened and came nearly flush with the surface; at the same time movement gradually returned. Within two months he was cycling, and in exactly two months he returned to his regiment.

13.—Capt. N., Headquarters. Woke one morning with acute myalgic pains in the left shoulder. The least movement was intensely painful. Salicylate ionization and light treatment. Pain relieved almost immediately, and resumed duty next morning.

Many other conditions are dealt with, *e.g.*, all resistant venereal sores are referred to this department with uniformly good results, but space forbids my quoting any

American sources,¹ that military base hospitals of importance in Germany include in their equipment "artificial suns," which form a part of their routine treatment. It is not a panacea for all ills, and, no doubt, many disappointing cases are met with, here as elsewhere, but it is a useful weapon in the war upon disease and the ravages of "war." In this connection, I am particularly impressed with its effect upon wounds, and the results of wounds, *e.g.*, scars and scar tissue.

Nor do I advocate my technique in any spirit of competition, but I use it because, for my purpose, I find it superior to other methods. For example, I know that scars may be treated with X-rays, or other forms of radiation. But how many people are competent to administer X-ray therapeutic doses, and, even so, the element of danger is never absent? The rational method is to combine and co-ordinate all remedial measures likely to benefit a particular case, and recent literature shows what can be done in this direction, notably the results attained by the French in their method of treating medical and surgical casualties by a co-ordination of hydro-, electro-, and phototherapy with massage and remedial exercises.

It will be noticed that I have dealt only with ultra-violet light, without even a passing reference to other forms of light treatment, and I regret that considerations of space have precluded my doing more than skim over the surface of the subject from an entirely practical point of view. If I succeed in arousing interest in others, I shall have attained my present object.

Finally, I have to express my gratitude to Mr. A. T. Moon, F.R.C.S., late surgical officer at this hospital, for his interest and assistance, and for affording me such excellent opportunities, of which I endeavoured to avail myself to the utmost. To other officers also, who from time to time have been attached here and have rendered me great assistance, I tender my thanks.

For permission to publish these cases, I am indebted to Colonel Turner, and to the authorities of the Aldershot Command.

¹ Vide *The Scientific American*, April 1, 1916, Report of Lecture by Professor H. Curtis, Ph.D.

consideration in an institution of this kind). My method is sufficiently indicated in the cases quoted. The point is to obtain a slight definite hyperæmic reaction, and to maintain it by subsequent exposures. This time period varies for each lamp, but, once known, is *fixed* for any one lamp, given fixed distance, temperature, voltage and amperage (the last three are provided for by the makers).

With a brief experience, one can use the lamp in a variety of ways and at any convenient distance, varying the time period accordingly.

PRECAUTIONS.

If we remember that we are dealing with "concentrated sunlight," the precautions are obvious. Those who have experienced reflected glare from snow at high altitudes, know how necessary it is to protect the eyes. Smoked or yellow glasses, *not blue*, suffice, or, better still, "Lister's green" glasses. Neglect of this will lead to acute conjunctivitis, and repeated exposure of the skin on the part of the operator will lead to "sunburn." An overdose will produce sunburn, *i.e.*, erythema, followed by blistering, which, however, dries off, leaving no scar.

Owing to the production of ozone, rubber is rapidly destroyed, and should not be used for insulation, etc.

I am not aware of any other "dangers" in the use of this radiation. I have worked with it daily for many months, and, on enquiry, the manufacturers tell me that they are not aware of any trouble amongst their work-people, who have been exposed to the light, in some cases, for years.

There is no scientific reason for suggesting that this light is "analogous to X-rays." Both are manifested in the ether, so are wireless waves and other wave-lengths; in fact, the physicist would be disposed to mark off X-rays and gamma-rays from other forms of radiant energy, for reasons I cannot go into here.

This brief report will, it is hoped, suffice to show that the ultra-violet light deserves a wider recognition as a therapeutic agent of the utmost value than appears to be the case in this country, at least. We know, from

If the case before us is not familial or hereditary, we shall do well to consider next whether jaundice is present or not. If it is, the disease is probably a sporadic case of cholæmia or else one of cirrhosis of the liver. The presence of other signs of cirrhosis is usually sufficient to differentiate the two; of these, ascites, gastric hæmorrhage, and the congested facies are most reliable. The history of alcohol addiction is not of much use, for this class of case has not usually a massive spleen, and the difficulty arises chiefly in children, in whom the ætiology of the cirrhosis is not known.

If there is no familial or hereditary history and no jaundice, the field for investigation is widened, and can best be narrowed by excluding certain types. First, we may exclude erythræmia or polycythæmia with cyanosis. In this, the face is very red and usually dry, the vessels of the conjunctiva are unusually full, and cyanosis follows exposure to cold or may be always present. If, in a case of splenomegaly of massive type, there is obvious congestion of vessels, and the blood flowing from a pin-prick is very dark red, the case is almost certainly one of erythræmia, and the only disease with which it is at all likely to be confused is congenital heart disease, in which, on very rare occasions, there is also splenomegaly.

We may also exclude the splenic anæmia of infancy or pseudo-leukæmia of von Jaksch. This sometimes occurs in twins, and is, to that extent, familial. Commonly, they are the subjects of rickets, and offensive diarrhœa is almost the rule. There is no jaundice but much wasting; in cholæmia, there is much jaundice but little wasting. Leukæmia at this age, *i.e.*, between eighteen months and the third or fourth year, is almost always acute, and accompanied by hæmorrhages from the gums and purpura. In splenic anæmia of infancy, there is little tendency to hæmorrhages and the onset is not acute. Chronic leukæmia at this age is almost unknown. The blood-examination will practically always provide a definite diagnosis, but should consist of a rather more critical study than mere enumeration of the cells. The examination of a blood film is of far more value than the counting of cells alone.

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THE DIAGNOSIS IN CASES OF MASSIVE
SPLENOMEGALY.

By GORDON WARD, M.D.

CHRONIC splenomegaly of extreme degree is associated with comparatively few diseases, yet often a correct diagnosis is never arrived at in such cases. Within recent years, splenectomy has become a much commoner operation than ever before. Obviously, a correct diagnosis should precede operation whenever this is possible. With the return of our soldiers from abroad, we shall be faced with a class of splenomegalies hitherto almost unknown in this country. The writer has already met with three such cases, and others doubtless have had a similar experience.

For these reasons, no apology is needed for approaching the question of the diagnosis and treatment of different classes of chronic massive splenomegaly, by which is meant chronic, firm, uniform enlargement of the spleen of such an extent that the lower pole is plainly palpable somewhere about the level of the umbilicus.

In the first place, it is well to enquire whether any other member of the family suffers from similar signs or symptoms, for, if this proves to be the case, one of only two forms of splenomegaly is almost certainly present, either cholæmia or acholuric hæmolytic jaundice, or the disease first described by Gaucher, in his Paris thesis of 1882, and now commonly known as Gaucher's disease. The former of these occurs not only in brothers and sisters but in parents and children too, *i.e.*, it is both hereditary and familial in many instances. The latter is familial but not hereditary. Both may be congenital and commonly are so, but they may occur in later life as well, and be apparently sporadic. The former is usually associated with jaundice, and this is liable to exacerbations, which are very characteristic. The latter has no jaundice, but is distinguished by a pigmentation (especially of the face), which is commonly described as brown or yellowish brown, and may, indeed, be mistaken for jaundice, since the sclera are pigmented as well.

If the case before us is not familial or hereditary, we shall do well to consider next whether jaundice is present or not. If it is, the disease is probably a sporadic case of cholæmia or else one of cirrhosis of the liver. The presence of other signs of cirrhosis is usually sufficient to differentiate the two; of these, ascites, gastric hæmorrhage, and the congested facies are most reliable. The history of alcohol addiction is not of much use, for this class of case has not usually a massive spleen, and the difficulty arises chiefly in children, in whom the ætiology of the cirrhosis is not known.

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We may also exclude the splenic anæmia of infancy or pseudo-leukæmia of von Jaksch. This sometimes occurs in twins, and is, to that extent, familial. Commonly, they are the subjects of rickets, and offensive diarrhœa is almost the rule. There is no jaundice but much wasting; in cholæmia, there is much jaundice but little wasting. Leukæmia at this age, *i.e.*, between eighteen months and the third or fourth year, is almost always acute, and accompanied by hæmorrhages from the gums and purpura. In splenic anæmia of infancy, there is little tendency to hæmorrhages and the onset is not acute. Chronic leukæmia at this age is almost unknown. The blood-examination will practically always provide a definite diagnosis, but should consist of a rather more critical study than mere enumeration of the cells. The examination of a blood film is of far more value than the counting of cells alone.

If, now, our case is neither familial nor hereditary, has

no jaundice, is not one of erythræmia, and the patient is not a young child, we are next forced to rule out, as far as possible, leukæmia as the disease present. The presence of enlarged glands is very strongly suggestive of leukæmia. These may be met with as well in Hodgkin's disease, but are then commonly quite hard by the time that the spleen is sufficiently large to bring the case into the class we are considering. In most cases of Hodgkin's disease, splenomegaly is relatively a subordinate feature. In leukæmia, the glands are usually soft and not so discrete as in Hodgkin's disease. Other points in favour of leukæmia (the glandular enlargement will not be very obvious in the splenomedullary form to which most cases with much splenomegaly belong) are hæmorrhagic tendency, comparatively sudden onset of deafness, vertigo, or tinnitus, or of all three, and possibly such unusual manifestations as tumours in the skin, persistent priapism, or enlargement of the salivary glands. A definite diagnosis must finally depend on blood examination. Without this, even a tentative diagnosis will be difficult in most cases.

Having decided whether the case is, or is not, one of leukæmia, we are left with the class of case to which the name "splenic anæmia" is usually applied. In all the diseases in this class, the distinguishing factor is the absence of very definite symptoms except splenomegaly and anæmia. The latter is absent at first. The question of an exact diagnosis may therefore have to wait for an autopsy, or even then remain unsolved. We will proceed to narrow down the diagnosis in such a case as far as possible.

If it is a case of Gaucher's disease, there will almost certainly be pigmentation, and the liver will be large. These two features are the rule in one other member of the class, but not in any others. The one other member is kala-azar, a disease endemic in the Mediterranean, India, etc., and usually associated with diarrhœa and an irregular hectic temperature; whereas Gaucher's disease is not commonly associated with either of these, and, moreover, does not confine itself to tropical or subtropical countries. A definite diagnosis can sometimes be made by blood-examination, for the parasites (*Leishmania donovani*) which cause kala-azar may be found in the circulating blood. Their detection

requires a rather expert acquaintance with blood-examination in general, and the *Leishmania donovani* in particular. A certain diagnosis may be made by spleen puncture. In kala-azar, the parasites are numerous; in Gaucher's disease, one finds the characteristic large "glassy" cells which are peculiar to this condition alone.

Very rarely, splenomegaly, hepatomegaly, and anæmia are found together in cancer of the stomach or other organ. In such cases, one is entitled to deduce that cancer metastases have reached the bones, although why this should be so it is difficult to say. But this being actually the case provides us with a means of ruling out such cases by careful search for broken ribs (spontaneous fracture), bone pains, which are often very severe, or other signs of cancer.

We have now ruled out of our splenic anæmia class three diseases, viz.: Gaucher's disease, occurring sporadically (splenic anæmia is never familial, and cases so reported are examples of cholæmia sine ictero), kala-azar, and cancer with bone metastases. We should eliminate as well infective endocarditis—a rare cause of decided splenomegaly.

If, now, the patient is a child, the disease is almost certainly either congenital (or even acquired), syphilis, or else one of those cases of cirrhosis of the liver, of unknown causation and capricious incidence already referred to. A Wassermann test will be of assistance here, as well as consideration of the health of the parents.

If the patient is an adult, cirrhosis of the liver is less liable to be accompanied by splenomegaly, unless it is actually consecutive to it. The history and duration of such symptoms as anæmia and ascites will probably decide this point. If it seems that the cirrhosis certainly developed later than the anæmia, or, than the splenomegaly, if the patient happens to know, then we are almost certainly dealing with a case of Banti's disease, which name is given to the terminal stage of idiopathic splenic anæmia. But even so, the possibility of syphilis must not be lost sight of. An absence of leukopenia would strongly suggest it, or any other failure to conform to the usual signs of idiopathic splenic anæmia. A Wassermann test should be performed. Very rarely tuberculosis has been known to give rise to a similar syndrome, but, in this case, other signs of tuberculosis will

	Hereditary.	Congenital.	Familial.
1. Chloræmia - - - - -	Usually	Usually	Commonly
2. Gaucher's disease - - - - -	Never	Sometimes	Usually
3. Cirrhosis of liver - - - - -	Never	Never	Rarely
4. Erythræmia - - - - -	Never	Doubtful	Never
5. Splenic anæmia of infancy - - -	Never	Never	Sometimes in twins.
6. Leukæmia (lymphatic) - - - -	Never	Rarely	Never
7. Leukæmia (myeloid) - - - - -	Never	Rarely	Never
8. Hodgkin's disease - - - - -	Never	Never	Rarely
9. Kala-azar - - - - -	Never	Never	Sometimes
10. Cancer with metastases - - -	Never	Never	Never
11. Malaria - - - - -	Never	Never	Sometimes
12. Anchylostomiasis - - - - -	Never	Never	Never
13. Egyptian splenomegaly - - - -	Not known	Not known	Doubtful
14. Syphilis with splenomegaly - -	Sometimes (syphilis)	Sometimes (syphilis)	Sometimes
15. Splenic anæmia (Idiopathic) - -	Never	Never	Never

	Tendency to Hæmorrhages.	Red Blood Cells.
1. Chloræmia - - - - -	Very little	Normal or low (many nucleated).
2. Gaucher's disease - - - - -	Occasional epistaxis	Normal or low (none nucleated).
3. Cirrhosis of liver - - - - -	Especially gastric and intestinal. Sometimes epistaxis.	Normal
4. Erythræmia - - - - -	Epistaxis and cerebral	Increased (none nucleated).
5. Splenic anæmia of infancy - - -	Very little	Low (many nucleated).
6. Leukæmia (lymphatic) - - - -	Marked	Low (few nucleated).
7. Leukæmia (myeloid) - - - - -	Marked	Low (many nucleated).
8. Hodgkin's disease - - - - -	Epistaxis, others infrequent in any but last stages.	Normal or low (none nucleated).
9. Kala-azar - - - - -	Epistaxis, not marked	Low (few or) (none nucleated).
10. Cancer with metastases - - -	None	Low (often) (some nucleated).
11. Malaria - - - - -	None	Low (none nucleated).
12. Anchylostomiasis - - - - -	Intestinal only	Low (none nucleated).
13. Egyptian splenomegaly - - - -	None	Doubtful
14. Syphilis with splenomegaly - -	None, except with cirrhosis	Normal or low (none nucleated).
15. Splenic anæmia (Idiopathic) - -	As in cirrhosis when this stage (Banti's disease) is reached.	Low (none nucleated).

Pigmentation.	Jaundice.	Liver.	Glandular Enlargement.
Rare	Usual	Variable	None
Usual	Never	Enlarged	Slight or none
Sometimes	Usual	Small	None
Never	Never	Normal	None
Never	Never	Variable, often enlarged.	Slight or none
Never	Never	Often enlarged	Marked, soft
Rare	Rare	Usually enlarged	Slight
Rare	Rare	Often enlarged	Marked, hard
Usual	Never	Usually enlarged	Slight or none
Never	Rare	Often enlarged	Variable
Sometimes	Sometimes	Variable	None
Sometimes	Sometimes	Normal	None
Doubtful	Doubtful	Doubtful	None
Never	Sometimes	Often cirrhotic	Variable
Never	Late stage	Late cirrhosis	None

White Blood Cells.	Effect of Splenectomy.	Other Treatment.
Normal or increased slightly.	Curative or beneficial	Symptomatic only. X-rays may be useful.
Normal or low, rarely increased.	Often beneficial but not curative.	Symptomatic only.
Normal	Useless	Symptomatic, and removal of cause if ascertainable.
Normal or increased	Fatal	Venesection. X-rays sometimes useful, often harmful.
Normal or increased	Sometimes beneficial but seldom necessary.	Cure of intestinal disorders.
Much increased	Usually fatal	Arsenic and X-rays.
Much increased	Usually fatal; rarely has seemed beneficial.	Arsenic and X-rays.
Normal or increased	Useless	Arsenic and X-rays.
Low	Useless	Very large doses of quinine (60 grains a day). Intravenous injection of tartar emetic.
Normal or increased	Useless	Symptomatic only.
Normal or low	Might be beneficial	Quinine.
Variable	Useless	Thymol and other helminthiodes.
Low	Probably beneficial	Symptomatic only.
Normal or low	Often beneficial	Anti-syphilitic. (This is not as useful as might be expected.)
Low	Curative or beneficial	Symptomatic only.

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15. Splenic anæmia (idiopathic) - -	Never	Never	Never

	Tendency to Hæmorrhages.	Red Blood Cells.
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2. Gaucher's disease - - - - -	Occasional epistaxis	Normal or low (none nucleated).
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BERIBERI.

By G. MARSHALL FINDLAY, M.B., CH.B.

Tempy. Surgeon, R.N.

HISTORICAL.

WITHIN recent years, much interest has been aroused by the discovery that the normal diet necessary for growth and nutrition does not consist solely of proteins, carbohydrates, fats, salts, and water, but must contain, in addition, certain organic substances, called by Funk "vitamines." By this discovery considerable light has been shed on the ætiology of certain diseases, more particularly beriberi. This condition is now almost universally acknowledged to be due to a lack of vitamins in the diet; in other words, beriberi is a deficiency disease, characterized pathologically by degeneration of the peripheral nerves.

Beriberi has long been recognized as a separate clinical entity, more particularly in Eastern countries, where the disease has been endemic for centuries. It is accurately described in Chinese documents of the second century, and it is probable that it is referred to in writings of as early a date as B.C. 2697. In Ceylon, although sporadic cases are now alone seen, the disease has long been known; in fact, the word "beriberi" itself is derived from a Singhalese word meaning "weakness."

In classical literature, the references are comparatively scanty, although Strabo, writing in the third century A.D., describes an epidemic as having occurred among a Roman army in Arabia in B.C. 24.

Modern interest in the disease, however, dates from the seventeenth century, when Dutch physicians came in contact with the condition in the East Indies.

The geographical distribution of beriberi is very wide. There appear to be three markedly endemic centres, one embracing Japan and Eastern China, the second including the Dutch East Indies (Java, Sumatra and Borneo), the Malay Peninsula and the Philippine Islands, and a third which

almost certainly be present, and the disease will be much more acute than other examples of splenic anæmia.

Thrombosis of the splenic vein is held by some to be a possible cause of this syndrome. It is much more likely a result, but, in any case, the treatment is the same. The diagnosis of thrombosis would hardly be justified, unless there was a very clear history of accident or sudden severe local symptoms definitely ante-dating any signs of anæmia or splenomegaly.

There are also three tropical rareties to be considered. The first is the malarial spleen. Possibly this is a myth, founded on a mistaken diagnosis of cases of kala-azar, which was formerly considered malarial. As a matter of fact, the first case of Gaucher's disease described in this country was considered to be malarial by some, because few other causes of splenomegaly were recognized at that time. In any case, a history of malaria lasting many years ought to be obtained, and a very thorough course of quinine by intramuscular injection carried out before malaria is accepted as a cause of massive splenomegaly. Another tropical rarity is splenomegaly in persons suffering from hook worm disease or anchylostomiasis. Examination of the fæces for worms, ova, or blood, and a history of this disease would eliminate this. The third tropical disease is one which is very little known, but has been described as endemic in Egypt and also in the French North-African possessions. It would appear to differ from kala-azar, in the absence of parasites, and from idiopathic splenic anæmia, in the absence of any tendency to gastric hæmorrhages. I do not know that this disease has ever been described in a European. It is included more for the sake of completeness than for any practical importance which it has for us at present. Kala-azar, however, is certainly of practical importance, which is shown by the fact that the writer has already met with three cases in soldiers of the British Expeditionary Forces.

The features of the different forms of splenomegaly dealt with are appended in a table, with notes on treatment, etc. It is admitted that many of these are very rare, but there are few practitioners of any standing who cannot recollect at least one or two cases of splenomegaly which gave them a good deal of trouble in diagnosis, or else remained undiagnosed and had only purely symptomatic treatment.

of the Japanese Navy was seriously impaired by the ravages of this disease. The men's rations, at this time, consisted almost entirely of white or polished rice, but by decreasing the rice, and increasing the other proteid constituents of the diet, from 109 to 196 grammes, the disease was almost entirely eliminated.²

Further investigations in regard to rice have shown that beriberi may most easily be produced by a diet composed of white or polished rice.

The larger portion of the rice grain is composed of starch. This central starch core is covered by a rather thin "aleurone" layer, which contains the fat and protein part of the grain. Outside this is the pericarp, which varies somewhat in colour, according to the variety of the rice, in some cases being white in others, red. In any case, it gives to the rice-grain a dirty appearance, which is highly distasteful to the native mind. Even though perfectly well aware of its dangerous nature, natives almost always prefer their rice "clean."

External, again, to the pericarp is the husk. In the process of milling, the husk and pericarp are removed, together with the greater part of the aleurone layer. By a process of parboiling, however, the pericarp is made to adhere more firmly to the grain, with the result that, on milling, there is much less loss of the aleurone layer. The results of eating polished rice are now so well known that it is hardly necessary to recall the various experiments which have been performed in this connection. Those of Frazer and Stanton in Java may, however, be mentioned, for they are now almost classical.

Four hundred and ninety-three Javanese coolies were employed in the experiments. Of these, 220 were fed on white rice, the remainder on the parboiled variety, with the result that among the former class, 20 cases of beriberi developed, while among the latter there were no cases.

By feeding fowls on polished rice, a condition is produced, which, pathologically, is indistinguishable from beriberi; if, then, rice polishings are added to the diet, the birds rapidly return to the normal. By this means it was shown by Funk, that, in the aleurone layer of the rice-grain, there is present an organic substance, which has the power of preventing the onset of beriberi. This "vitamine" is of unknown constitution, but is basic in character, and contains nitrogen.

involves Brazil. The disease is also prevalent, though to a less extent, in India, Northern Australia, and on the coast of Africa.

More recently, the condition has been recorded as occurring in the Richmond Asylum, Dublin, and among the fishermen on the coast of North America, thus showing that the disease is not by any means confined to tropical and subtropical regions.

In connection with the geographical distribution of the disease, it is of interest to note that it is much more common in seagirt islands, and around the shores of continents; in fact, it rarely, if ever, penetrates into the hinterlands.

The present article is based on a series of 36 cases which have lately occurred in certain ships on the Egypt and East Indies station, *i.e.*, an area including the Persian Gulf, Indian Ocean, Red Sea and Suez Canal zones. The patients included Europeans, Chinese coolies, and native Indians.

Although scurvy has almost entirely disappeared from ships, beriberi is still, unfortunately, of comparatively common occurrence.

ÆTIOLOGY.

The ætiology of beriberi has long been a vexed question. Two main theories have been held as to its causation. The first of these regards the disease as being due to some bacterial infection. McCarrison claims to have made cultures of an organism from the liver, spleen, kidneys and heart of fowls suffering from the analogous condition of polyneuritis gallinarum, produced by feeding on white or polished rice. By injecting cultures of this organism, he states that he has been able to reproduce a disease which appears to be a typical neuritis. These experiments, however, have been carefully repeated by Williams and Johnston,¹ who are unable to confirm any of McCarrison's essential findings. Another fact, which is strongly opposed to a bacterial theory, is that beriberi does not spread by contact.

The second theory, which regards the disease as being due to the absence of an essential constituent in the diet, is now generally accepted.

Attention was first called to the question of diet in connection with beriberi by Takaki. At one period the health

of the Japanese Navy was seriously impaired by the ravages of this disease. The men's rations, at this time, consisted almost entirely of white or polished rice, but by decreasing the rice, and increasing the other proteid constituents of the diet, from 109 to 196 grammes, the disease was almost entirely eliminated.²

Further investigations in regard to rice have shown that beriberi may most easily be produced by a diet composed of white or polished rice.

The larger portion of the rice grain is composed of starch. This central starch core is covered by a rather thin "aleurone" layer, which contains the fat and protein part of the grain. Outside this is the pericarp, which varies somewhat in colour, according to the variety of the rice, in some cases being white in others, red. In any case, it gives to the rice-grain a dirty appearance, which is highly distasteful to the native mind. Even though perfectly well aware of its dangerous nature, natives almost always prefer their rice "clean."

External, again, to the pericarp is the husk. In the process of milling, the husk and pericarp are removed, together with the greater part of the aleurone layer. By a process of parboiling, however, the pericarp is made to adhere more firmly to the grain, with the result that, on milling, there is much less loss of the aleurone layer. The results of eating polished rice are now so well known that it is hardly necessary to recall the various experiments which have been performed in this connection. Those of Frazer and Stanton in Java may, however, be mentioned, for they are now almost classical.

Four hundred and ninety-three Javanese coolies were employed in the experiments. Of these, 220 were fed on white rice, the remainder on the parboiled variety, with the result that among the former class, 20 cases of beriberi developed, while among the latter there were no cases.

By feeding fowls on polished rice, a condition is produced, which, pathologically, is indistinguishable from beriberi; if, then, rice polishings are added to the diet, the birds rapidly return to the normal. By this means it was shown by Funk, that, in the aleurone layer of the rice-grain, there is present an organic substance, which has the power of preventing the onset of beriberi. This "vitamine" is of unknown constitution, but is basic in character, and contains nitrogen.

It is soluble in alcohol, stable in acid, and unstable in alkaline solution; it can be dialysed. It is destroyed by a temperature of 130° C., but it remains active at 100° C., thus differing from the anti-scorbutic vitamine, which ceases to act above 70° C. Although it does not itself contain phosphorus, the amount of this substance in the rice-grain is in some way related to the amount of vitamine, since beriberi-preventing rice always contains more than 0.4 per cent. of phosphorus pentoxide. The phosphorus content of the rice-grain is now used as a test by the Governments of Singapore and the Malay States, in order to determine whether rice is fit for consumption.

The vitamine appears to be destroyed as well by the growth of moulds. Four cases of beriberi recently arose among native Indians employed in a naval storeship. The diet had consisted of unmilled rice and curry, and, as a result, the appearance of beriberi was somewhat unexpected. On examining the rice, however, it was found that a large proportion had become mouldy through being kept in a damp store. Precautions have now been taken to prevent such a contingency again arising, with the result that no further cases of beriberi have occurred in this ship. Beriberi may, however, arise in persons who have never lived on rice as a staple diet. This was the case with all the European sailors who suffered from the disease. In every instance, however, there was a typical history, in that the patient had, for a shorter or longer period, lived on a diet deficient in vitamins. In addition to unmilled rice, there are several foodstuffs which are especially rich in vitamins, such as yolk of egg, yeast and barley. Boiled white potatoes, salt meat or fish, condensed milk and all tinned foods, on the other hand, contain no vitamine, since in the process of preservation the special anti-beriberic substance is destroyed by heat.

The importance of attention to the diet is well brought out in the following case:—

The patient, a stoker, contracted malaria in the Persian Gulf, and was treated for three weeks in the ship's sick bay for this condition. He was about to return to duty, when he quite suddenly developed marked œdema over the dorsum of both feet and the anterior aspect of the legs. At this time, both the knee and Achilles jerks were exaggerated, but within

a week, first the ankle, and then the knee reflexes, had disappeared, the case becoming one of typical beriberi. During the three weeks that the patient was under treatment, his diet had consisted almost exclusively of condensed milk.

In the other cases a somewhat similar history was obtained, the dietary consisting of salt pork, tinned meat and boiled white potatoes—the latter, once a week.

Beriberi began to appear among the crew one month after the commencement of the above *régime*; the disease was confined to the lower deck, where the menu was less varied than in the wardroom. In this epidemic only two cases were severe, the others improving rapidly under a more liberal diet.

It will thus be seen that beriberi is produced whenever a diet free from vitamines is persisted in for any length of time. In other words, beriberi is exactly analogous to myxœdœma. In the former case, there is a deficiency of vitamine with resulting degeneration of the peripheral nervous system, in the latter, a deficiency of thyroid secretion, with a degeneration of the subcutaneous tissues and central nervous system. As to the manner in which the vitamine acts, very little is yet known. Shaumann considers that it probably plays the part of an activator, and, in support of this view, has shown that the neuritis arises more rapidly with an increased ingestion of carbohydrates. The effects of thyroid extract on carbohydrate metabolism are well known. A further analogy between beriberi and myxœdœma is to be found in the following facts. The pups of a dethyroidized bitch suffer from cretinism; in exactly the same way, the babies of mothers suffering from beriberi exhibit this disease, the effects in both cases being due to the lack of some essential constituent in the milk.

In addition to the deficiency of vitamine, which may thus be looked upon as the exciting cause, it is probable that there are certain predisposing causes, of which the most important are the temperature and relative humidity of the atmosphere.

In an epidemic, which occurred in an auxiliary cruiser employed on patrolling duties, there were, in all, 28 cases on board—of these, 20 were in stokers.

In the Philippines, beriberi is much more common among

men than women, although the diet of both sexes is practically the same. The men, however, are largely employed in the mines, in which the air is hot and moist.

PATHOLOGY.

The pathological changes met with in beriberi are comparatively easy of explanation, provided that the fundamental lesion is recognized. This consists of a degeneration, affecting the whole of the peripheral nervous system, motor, sensory and autonomic fibres alike sharing in the process. The degenerative changes are of a Wallerian type; the myelin sheath becomes broken up into fatty globules, while the axis cylinders show fragmentation, and finally disappear. As a result of these changes, pathological processes are set up in both striped and unstriped muscular fibres. The former lose their striation, and undergo colloid degeneration, while in the heart musculature there is some fatty change, combined with vacuolation and segmentation of the fibres. The heart, as a whole, is hypertrophied, the right ventricle, in addition, being somewhat dilated.

Following on the backward pressure from the heart, there is congestion of the liver, with the characteristic nutmeg appearance of the organ. The kidneys may also show congestive changes, the effects of which are, however, most noticeable in the stomach and duodenum. Here, also, minute hæmorrhagic extravasations may be met with. In the pleural and peritoneal cavities, there are frequently collections of serous exudate, while the subcutaneous tissues, more particularly of the lower extremities, are sodden with fluid. This œdema is in part due to the changes in the heart, in part to degenerative changes in the peripheral vasomotor nerves.

CLINICAL SYMPTOMS.

In the classical descriptions of beriberi, two clinical types are usually distinguished, one, an œdematous form, characterized by swelling of the lower extremities, the other, a paralytic form. In the present series, however, all the cases were of the former type.

"The incubation period," if such a term may be employed, was in every case short. In only one instance did it exceed seven weeks, while, in the majority, the particular diet had

only been persisted in for a period of from three to four weeks. Of the earliest symptoms, one of the commonest was loss of appetite. In many instances, a vicious circle was thus undoubtedly produced, since the patients had themselves caused a voluntary decrease in the quantity of food consumed.

The main symptoms, however, were swelling of the feet and legs, shortness of breath, and general lassitude. On examination, there was found marked swelling on the dorsum of the feet, around the ankles, and over the anterior aspect of the legs. The swelling usually extended as high as the junction of the middle and lower-thirds of the leg, and was roughly symmetrical on both sides.

In about half the cases, œdema was present over the sternum and anterior aspect of the thorax, as well as over the cheekbones and forearms. The swelling was of firmer consistence than that of Bright's disease. There was considerable muscular weakness, and, in some instances, the muscles of the legs showed the typical reaction of degeneration. On squeezing the calf muscles firmly, considerable pain could be elicited, and the same was true of the flexor muscles of the forearms.

For the first few days, the deep reflexes—knee and Achilles jerks—were exaggerated; soon, however, first the ankle, then the knee jerks vanished, and remained absent, even after the other symptoms had disappeared. No ankle clonus was ever elicited, and the plantar and other superficial reflexes remained unaffected.

In the most pronounced cases, the gait was ataxic, the ataxia being associated with a certain amount of foot drop. At first there was some hyperæsthesia to touch, and pain over the anterior aspect of the legs, but this soon gave place to complete cutaneous anæsthesia. In some instances, additional areas of anæsthesia were present over the abdomen and forearms.

The special senses were unaffected, and in this series of cases there was no instance of any interference with the innervation of the pharynx or larynx. The respiratory system was normal; hydrothorax, a not uncommon complication, was only once encountered.

The cardio-vascular system requires special notice, since in every case important symptoms were referred to the heart.

Pain over the præcordial area, shortness of breath, and palpitation on exertion were all present, and, in several instances, the patients suffered from attacks of syncope.

On inspecting the thorax, the apex beat was found to be displaced downwards and outwards, and to be diffuse in character. A distinct heaving of the chest wall was noticeable during systole. Percussion revealed an increase of the cardiac dullness, more particularly towards the right. On auscultation, certain characteristic phenomena were present in connection with the heart sounds. By auscultation alone, great difficulty was experienced in determining the first and second sounds, owing to the peculiar spacing of the beats which has been aptly compared by Manson to the rhythm of a pendulum. In addition, the heart sounds were of a tic-tac character, probably because of myocardial changes. Although definite bruits were of rare occurrence, reduplication of the second sound, more particularly in the aortic area, was comparatively common. The pulse rarely exceeded 100 per minute, but the rhythm was often irregular and the tension always low.

In appearance, the patients were often anæmic. The red blood corpuscles were usually decreased to 3,500,000—4,000,000 per c.mm., while the leucocyte count was always increased, more especially as regards the polymorphonuclear leucocytes. In this connection, it is interesting to note that, both in ætiology and clinical symptoms, there are certain broad similarities between beriberi and chlorosis. Both diseases show a preference for one particular sex. Dietetic and hygienic conditions play a definite part in the ætiology of both. In both conditions, the heart is markedly affected, and, lastly, the cure in each case consists in the addition of a specific substance to the food, iron in chlorosis, vitamine in beriberi.

Except for the loss of appetite, and, in some cases, severe dyspeptic symptoms, there were no abnormalities in the alimentary system. The urine was always normal. Hewlett records the presence of spherical refractile bodies in the urine. These are said to vary from 15—30 μ . in diameter, but, after careful search, I am unable to confirm their presence.

DIAGNOSIS.

The differential diagnosis of beriberi is not difficult, when

once the possibility of its occurrence has been recognized. This is more especially the case on board ship, where isolated cases rarely, if ever, occur.

The following test, described by Willcox,³ is of great service in detecting early cases of beriberi. The patient is directed to squat on his haunches, separate the knees, and finally attempt to regain the erect posture. In cases of beriberi, the patient finds it necessary "to climb up himself," by resting his hands on his knees, in the same way as a boy suffering from pseudohypertrophic muscular paralysis.

Other forms of dropsy have sometimes been confused with beriberi. In all forms of Bright's disease, including the epidemic nephritis of the trenches, there are characteristic urinary findings—albumen and casts, while, in heart disease, there is a history of long continued cardiac disability, associated, in many cases, with a previous attack of rheumatism or syphilis. Neither Bright's nor heart disease have any of the nervous symptoms so characteristic of beriberi.

Epidemic dropsy, a somewhat rare condition, of which the ætiology is unknown, is characterized by pyrexia and an erythematous rash over the lower extremities.

Slight cases of beriberi are not infrequently put down to anæmia or rheumatic changes; here, again, the nervous symptoms are sufficient to differentiate the true condition.

Peripheral neuritis due to alcohol, arsenic, or diphtheria may be mistaken for beriberi. Among sailors, particularly, an alcoholic history is not infrequently obtained. In alcoholic neuritis, however, there is almost always some involvement of the mental faculties. In arsenical neuritis, the rash and presence of arsenic in the hair and urine are characteristic, while postdiphtheritic paralysis affects chiefly the muscles of the eye and palate.

Scurvy is not infrequently combined with beriberi. In the former condition, however, there is swelling of the gums, a purpuric rash, and tenderness over the anterior surfaces of the tibiæ—due to subperiosteal hæmorrhages. Nervous symptoms are conspicuous by their absence.

It must be understood that, at present, there is no laboratory diagnosis of beriberi.

TREATMENT AND PROPHYLAXIS.

From what has been previously said, it is obvious that

the main line of treatment must be to supply the deficiency of vitamine. Even in very slight cases, the patient should be kept in bed for some days, for the rapidity with which alarming symptoms may develop is surprising. Great care should be taken over the question of diet. Yeast, in virtue of the large amount of vitamine that it contains, should be included in some form or another in the diet. Dried yeast may be stirred up with milk to form a paste, and this, when sweetened with sugar, makes quite a palatable dish. Recently, attempts have been made in America to concentrate the yeast vitamine.⁴ Substitutes for yeast may be found in porridge, oats, and pea soup, while raw or lightly-cooked eggs are of great value.

The special symptoms of the disease require treatment. Strychnine or digitalis should be given for the cardiac condition, while, in cases of syncope, adrenalin is of service. Massage and electricity are required for the neuritis.

Prophylaxis is of the very greatest importance, since, with proper precautions as to diet, there appears to be no reason why beriberi should not vanish from among the diseases of the present day.

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² Gatewood. *Naval Hygiene*.

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DIFFICULT DISLOCATIONS IN GENERAL PRACTICE.

By W. PAULSON, L.R.C.P. & S.

DISLOCATIONS, even rare ones, have a knack of cropping up in general practice, without even Paul Pry's excuse of "I hope I don't intrude." One of the most unmanageable and disastrous is undoubtedly congenital dislocation of the hip. Failures gall me, as I suppose they do most people, and the verdict, "Nothing can be done," always, I fear, arouses my obstinacy.

A particularly distressing failure, in the earlier years of my work, was the sight of a good-looking youth sitting, from his hips upwards, like an image of Buddha. I shared the responsibility with several hospitals and specialists, but the result of our efforts was negative. The much be-trumpeted operations of a few years ago apparently only inflicted suffering, and left the unfortunate victims in a worse state than before.

A short time ago, I came across a case of this kind, and, watching the child, I perceived that, by placing her feet together and spreading her knees widely apart, she produced the forward dislocation quite easily and painlessly. Ordinarily, I think the dislocation is either directly forwards or backwards. If forwards, the child places its feet together and abducts the thighs, there is little to restrain it, and the result is certain. In case the head escapes backwards, I think it is somewhat easier to deal with.

After watching the child previously mentioned, and care-

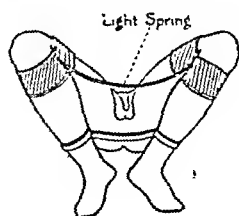


FIG. 1.

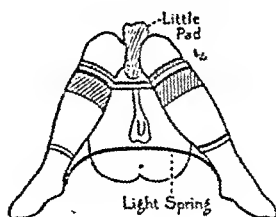


FIG. 2.

fully considering the question, I devised the plan as shown in Fig. 2 to defeat the manœuvre. The knees are shackled

together and the feet kept wide apart.

With young children (and, of course, treatment should be as early as possible), I think a silk handkerchief, divided into two triangular bandages and looped in figure of eight above and below the knee, would suffice, the ends being tied together, and only one removed at a time.

The feet should be kept apart by a light, nickelled-steel spring, fitted to warm and comfortable boots. It is impossible to extend the legs under these circumstances.

As regards dislocation backwards, tucking one knee under the other and spreading the feet accomplishes the luxation only too promptly. Spreading the knees, and shackling the ankles, as illustrated in Fig. 1, entirely prevents this occurring. Both methods allow of a sufficiently moderate movement for comfort, and the freest possible access for washing, powdering, and tending the baby. A somewhat narrow crib, and a horseshoe rubber cushion, would also afford support to the hip joint. Both positions are inelegant, but so natural and comfortable to babies that they may be maintained for any length of time. When there is practically no acetabulum, I fear the case is hopeless.

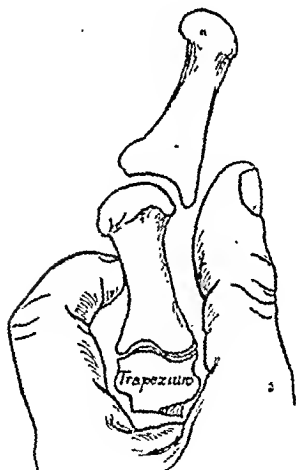
Another dislocation is notoriously troublesome—that of the thumb at the metacarpo-phalangeal joint. The following

little manipulation, which I first practised many years ago, and which has never failed to reduce it, is well worth trying before resorting to the usual anæsthetic.

Suppose it is the left thumb, place your left hand over the back of the patient's left, press your index finger firmly between his metacarpal and hand to steady it, then flex his thumb to release it from short flexors.

Turn it outwards at almost a right angle, press *firmly*, with the ball of your left thumb, on the dislocated end of his phalanx, fol-

lowing it up as you elevate sharply, with your right hand. In this way, reduction is easily and quickly accomplished, sliding smoothly over the convex head.



GALVANO IETRIC DIAGNOSIS AND DIELECTRIC THERAPY.

By GEORGE MAHOMED, M.R.C.S.

Bournemouth : Late Registrar, Pathologist, and House Surgeon, Royal Victoria Hospital, Bournemouth, etc.

DR. HORNE WILSON'S observations¹ on electric manifestations to be observed in the human body in health and disease are very interesting. His account of the variations induced by inflammation are suggestive, but I have not the practical acquaintance with ions and electrons to enable me to follow it closely. The jump from his theories to his therapy, however, needs a considerable stimulus to enable one to negotiate it. He says: "It was presumed, from an electrical point of view, that if this leak or escape of energy from the nerves, due to faulty insulation, could be stopped, then this energy or trophic influence would be restored to the tissues." He then states that he has procured an oil which he considers is free of foreign ions, and recommends that this should be applied to the skin over an inflamed area, or over the site of nerve trunks, which he accuses of "leaking." His explanation is that there is an actual fault of insulation in the nerve tissue, and it is to be met by applying an insulating material just as you apply a little gutta-percha or insulating tape to a faulty bell wire.

A celebrated schoolmaster once said something to this effect: "If I gave some facts to a class and based on them a faulty theory, I could convince about half the class by the apparent soundness of my arguments, but the other half would reject the theory from a kind of innate common sense."

Dr. Wilson's theory seems to me to be lacking in imaginative detail. It is too crude. To place oil on the skin to cure a leak in the cord is like asphaltting the Strand to cure a leak of sewer gas in Oxford Street. What about the bones,

¹ THE PRACTITIONER, August, 1916.

muscles, and blood vessels? Will they not carry the extravasated ions and electrons to some other point of the skin, where they can meet their affinities—and be happy? I do not doubt that the application of oil will modify the galvanoscopic reading. A little while ago I had an illustrative experience. I was applying faradization to a limb undergoing paresis from syphilitic neuritis. The contractions I was wont to produce did not appear. The patient immediately suspected the battery, but that appeared to be giving current. I enquired if he had been massaged that day. He said, "Yes, an hour before you came." I also learnt that the masseur used oil. After washing the skin with soap and water, and applying a stronger saline solution to the electrodes, the normal reactions to the current appeared. It is therefore very likely to happen that a patient who showed a variation on one part of the body might, after application of oil, show no deflection. For instance, Dr. Wilson notes, in Case T.: "There was an off-scale deflection from both the upper and lower right cervical sympathetic. The dielectric oil was applied to those areas, where there was an escape of energy, for 14 days, and he was re-tested a week later and no off-scale deflections were obtained."

Some of Dr. Wilson's explanatory statements are the assertions of generally received opinions, but others seem to be opinions he has formed without giving us any particular reasons to justify them. An example of the first variety is: "It is now known that trophic nerves control the nutrition of those parts of the organism which they supply." Obviously, that was the opinion of those who first called them trophic nerves. An example of the second sort occurs two paragraphs lower. "It is certain that neuro-electricity differs from all forms of electricity which can be generated either chemically or dynamically, since it possesses the power to charge nervous ganglia, which act as stores of neuro-energy required as auxiliary to the constant brain current, and are able to be called into action as required, either automatically or voluntarily, as the case may be." It is not a very pretty sentence, and it contains two assertions which require some proof. How does he know that neuro-electricity possesses the power to charge nervous ganglia? And what evidence is there that anybody can

voluntarily discharge their nervous ganglia so as to supplement the constant brain current?

I have stated that I am not very sure of my ground when discussing the behaviour of ions and electrons, but is Dr. Wilson in much better case? He says: ". . . quinine, iodine, and compounds of arsenic and mercury are capable of re-appearing in the sweat . . . These, when in contact with the oil, have the power of ionizing it. . . for the same reason no acid drinks, such as lemon or any fruit should be given, except, perhaps, bananas." None of these substances are known to be radio-active. I thought it required a radio-active substance, such as radium or mesothorium, to ionize a medium. They may make it a conductor instead of an insulator, but I do not think they ionize it. If you put some thorium on an insulated plate, and bring a copper plate connected with a gold-leaf electroscope above it, and give the electroscope a charge, instead of retaining it for some hours, it will lose it, because the thorium will ionize the air. But if you put oil, containing arsenic, mercury, quinine or iodine, in the first receptacle, it will not cause the gold leaf to discharge (unless, perhaps, under influence of a current.)

The question of the possible action of the atmospheric electric charge in modifying health or disease is one which I have watched for some time. Dr. Wilson mentions that one of his patients "was depressed in thunderstorms, but not so when he was wearing rubber boots." This may be a protective influence in some cases, but I expect not in all. Last month, I was recording variations in atmospheric electricity while a storm was passing, about five miles off (at least, that was the nearest point at which rain fell). The reading was very strongly negative during its continuance, with repeated instantaneous drops corresponding to each flash of lightning. The rubber boots, in such a case, would, one supposes, have been of no effect, since the earth and the superjacent atmosphere were of the same sign.

One imagines, however, that if the leaks Dr. Wilson discovers constantly take place from the skin, that effects should ensue from moving a patient into an atmosphere showing a generally high potential—such as a mountain top. Perhaps some of the benefits of open-air treatment

may be due to the electrical re-action obtained.

Dr. Wilson is, of course, entitled to say: "No matter if my theories do not please you—my treatment is successful." I think we must admit some success. No doubt all, and more particularly self-confident, medical men cure nervous cases by a hypnotism of which they are not conscious, but many of his cases, such as pneumonias, are not curable by any psychical action, conscious or otherwise. How is it to be explained? Well, applications to the chest wall have always been used in pneumonia—poultices, ice, antiphlogistine. It is possible that cotton-wool and oil may act by inducing hyperæmia, as recommended in certain diseases by Bier. But I do not wish to minimize Dr. Wilson's success. My object is only to examine a new method and theories of disease, as we ought to do, before adopting or condemning them. Dr. Wilson has had independent testimony to the value of his diagnostic method in the case of injury to nerves. Dr. Longridge's paper¹ appears to prove conclusively that a damaged nerve implies a loss of conductivity over the area of its distribution. This may be a great addition to our methods of diagnosis.

¹ *B.M.J.*, May 20th, 1916, p. 717.

CASE WITH COMMENTS.

TRAUMATIC WINGED SCAPULA.

By SIMON HARRY BENNETT, M.B., Ch.B.

*Late Resident Physician in the Lord Derby War Hospital, Warrington;
Resident Medical Officer in the Norfolk War Hospital, Norwich.*

THE following case of marked winged scapula of traumatic origin came under my observation at the Lord Derby War Hospital, Warrington:—

Private Wm. L., æt. 34, sustained an injury, towards the end of February, 1915, to the top of his right shoulder region whilst engaged in traversing a gun. His position at the time of the injury was this: With the left arm in a semi-flexed position, the left hand had hold of the spokes of the wheel on one side, the right hand gripping the spokes of the wheel on the opposite side. In this position the patient suddenly slipped and fell against the wheel laterally forwards. The left shoulder region butted against the wheel $1\frac{1}{4}$ in. below the left clavicle parallel, and for a distance corresponding to its (the clavicle's) outer half. The immediate pain felt after the occurrence of the accident was of a most trivial nature. But it soon subsided altogether, and, during the subsequent three days, there was absolutely no pain, and no interference whatever of the functions of the left arm. At the end of that time, however, pain in the region struck, and radiating along the external border of the trapezius almost to the nape of the neck, developed, and almost concomitantly with the pain "weakness" and limitation of the normal movements at the left shoulder joint. This functional impairment progressed in severity, so that, in a short time, there was complete inability to abduct the left arm beyond the horizontal. The patient definitely states that, at no time since the accident, has there been a swelling (hæmatoma or otherwise) at or in the neighbourhood of the region struck. Over three months after the infliction of the injury, when I first saw him, the patient presented the following signs and symptoms:—

- (1) Pain of a rather severe nature on attempting to extend or otherwise move the affected arm, but none practically when the limb was completely at rest;
- (2) Complete inability to abduct the arm beyond the horizontal;
- (3) Paralysis and severe wasting of the rhomboids, supraspinatus, and infraspinatus (the atrophy being most extreme in the rhomboids), as well as paralysis of the serratus magnus;
- (4) The scapula on the affected side was nearer the spinal column

may be due to the electrical re-action obtained.

Dr. Wilson is, of course, entitled to say: "No matter if my theories do not please you—my treatment is successful." I think we must admit some success. No doubt all, and more particularly self-confident, medical men cure nervous cases by a hypnotism of which they are not conscious, but many of his cases, such as pneumonias, are not curable by any psychical action, conscious or otherwise. How is it to be explained? Well, applications to the chest wall have always been used in pneumonia—poultices, ice, antiphlogistine. It is possible that cotton-wool and oil may act by inducing hyperæmia, as recommended in certain diseases by Bier. But I do not wish to minimize Dr. Wilson's success. My object is only to examine a new method and theories of disease, as we ought to do, before adopting or condemning them. Dr. Wilson has had independent testimony to the value of his diagnostic method in the case of injury to nerves. Dr. Longridge's paper¹ appears to prove conclusively that a damaged nerve implies a loss of conductivity over the area of its distribution. This may be a great addition to our methods of diagnosis.

¹ *B.M.J.*, May 20th, 1916, p. 717.

us the salutary lesson not to treat as trivial, when we are consulted immediately after the occurrence of the injury, any case of more or less severe traumatism, sustained in a situation harbouring important nerve structures, in which no immediate symptoms or signs are manifest.

In military, not less than in civil, practice the patient should always be given the benefit of the doubt, and complete rest and other local treatment (fomentations, massage, electricity, etc.) enjoined for a while. Not that this will prevent the advent of neuritis, but it may do so, and, moreover, it may tend to mitigate the severity of the neuritis once this has developed. In the case recorded, treatment was commenced a week or more after the occurrence of the injury, but, at the end of about five months' time, not a whit of improvement had resulted, excepting that pain was no longer an active symptom.



on attempting to abduct the arm to the horizontal, in consequence of injury to the posterior thoracic and paralysis of the serratus magnus, which also accounted for a condition of winged scapula of as severe a degree as it is possible to encounter on attempting to raise the arm forwards horizontally, the scapula standing out then almost at right angles to the surface of the thorax.

From the clinical manifestations, we are here obviously dealing with a condition of traumatic neuritis of the fifth and sixth cervical roots, the nerves affected being the posterior thoracic, the suprascapular, and the nerve to the rhomboids.

It is somewhat singular that, for three days subsequent to the infliction of the injury, there should be complete immunity against pain or other disability, pointing to a traumatic lesion of nerves or other tissues at the site of injury. This would appear to be not uncommon, inasmuch as I have more recently encountered a condition of traumatic winged scapula in another soldier who sustained an injury near the same situation, and from whom an exactly similar chronological order of symptoms was obtainable.

Nerve tissue would appear to be more resistant than other tissues to influences capable of inducing inflammatory and the degenerative processes, as is evidenced, *inter alia*, by the slowly progressive character of many nerve affections, and comparative freedom from involvement of nerve tissue in most general infective diseases. Similarly, for obvious reasons, the process of repair in nerve tissue is more gradual, and restoration of normal function less frequent and complete than in other less highly organized tissues. But, for an adequate explanation of the complete absence of symptoms during the (few) days immediately subsequent to the infliction of the trauma in the above-mentioned cases, other considerations must be borne in mind. Firstly, the actual nerve implication may possibly have been the result of extension from adjacent inflammation; secondly, the surroundings of the patients were such as completely to divert their minds from attention to or recognition of symptoms not severe in character, with which factor might be coupled the personal equation; and thirdly, there may have been a certain degree of "stunning" (anæsthesia) of sensory nerves. From the diagnostic as well as, perhaps, therapeutic view-points, the cases referred to afford

Practical Notes.

FATTY BODIES AS VEHICLES FOR VACCINES.

The possibilities of fatty vehicles for vaccines have been the subject of independent enquiries by Le Moignic and Pinoy, using a mixture of liquid paraffin and lanoline as the vehicle, and by Professor Achard and Foix, using olive oil. The respective results were communicated briefly at meetings of the *Société de biologie* in March of this year.

The leading idea in each case was to obtain absorption of the immunizing bodies more slowly than with vaccines emulsified in saline, and in this way to lessen the reaction following the injection. In addition, Achard and Foix proposed giving, in one injection, larger doses of the vaccine, so as to prevent delay in vaccination, expediting which, under war conditions, is an obvious advantage. The chief drawbacks to anti-typhoid vaccination are the risks of general reaction and the relatively long time required to obtain immunization without danger.

These new vaccines—lipo-vaccine (Le Moignic and Pinoy), oleo-vaccine (Achard and Foix)—when injected into animals, show their protective effect, and bring about the formation of antibodies more slowly, in accordance with expectations, than is the case with the usual vaccines prepared with saline.

In May, Le Moignic and Pinoy reported favourable results from their first trials with men. In August, Chantemesse announced at the *Académie de Médecine*, excellent results obtained in the Navy from this kind of vaccine, containing a mixture of *B. typhosus* and *B. paratyphosus* A. and B.

In September, Prof. Achard made it known that he and Foix, by means of an improved technique, had produced an oily vaccine containing the mixture of the same three bacilli, the complete sterility of which was absolutely secured; this condition, although always rigidly necessary, is not, perhaps, always realized in some of the usual preparations. The injection of one dose, equal to four successive doses of the saline vaccine commonly used, did not produce a sharper local reaction, nor, as a rule, a general. Achard considers these results to be very encouraging, and to hold out hopes that the new preparations will realize an advance in the practice of antityphoid vaccinations, and will remove the prejudices which still persist with regard to them. —(*Journ. des Praticiens*, September 16, 1916.)

SODIUM BROMIDE IN DYSPEPSIA.

Leven attributes dyspepsia to an irritation of the solar plexus, and, consequently, in its treatment makes considerable use of bromide of soda, the most powerful and least toxic sedative of the

CASE WITH COMMENTS.

EGG-POISONING AND ASTHMA.

By HUGH S. PALMER, M.B., Ch.B.

Captain R.A.M.C.(T.).

CASE.

A RIFLEMAN, aged 22 years, reported to me at 9 o'clock in the evening, suffering considerable pain from a profuse cedema of the upper and lower eyelids of both eyes.

He stated that he had eaten an egg for tea at 5 o'clock that afternoon, and, at 6.45, had felt the first symptoms. He had suffered in a similar way after eating an egg on two previous occasions, and, therefore attributed the attack to that cause.

On examination, he was found to have a well-defined urticarial eruption, especially prominent on the abdomen and thighs. The irritation was considerable but not intense. There was no collapse, properly speaking, but the pain in the eyelids was severe. He had no sickness.

He was given three grains of calomel, and sent to bed. Bathing the eyes with a cool lotion increased rather than diminished the pain. On the following morning, the symptoms had considerably abated, and, in three days, completely disappeared.

He has frequently eaten eggs, and food containing egg, without suffering in this way, but has had three previous attacks—once after eating a macaroon biscuit, and twice after an egg. He invariably suffers from a short-lived acute gastritis, with herpes of the lips but no urticaria, after eating fish.

He was rather unwell, and had a "bad arm," after vaccination; after inoculation for typhoid, he had no more than the normal amount of discomfort. As I have only recently joined the battalion, I cannot corroborate these last statements. He states that he never suffered in this way before joining the army.

The interest of the case, however, appears to lie in the fact that he is distinctly asthmatic—due, I presume, to the same diathesis. He states that he had frequent attacks as a boy, that these disappeared after leaving school, but began again soon after joining the army. He frequently has attacks of difficulty in breathing with "wheeziness" about bedtime, and again in the early morning, but never during the day.

I should be very glad of any suggestions for treatment of this asthma.

which was recommended by Barthe de Sanfort as long ago as 1904. He has had under his care, during the last two years, many cases of burns caused in warfare and has found this preparation of great value. It is used chiefly for burns, but is equally suitable for other lesions, and especially for chilblains. It is a mixture of paraffin and resin, much resembling flexile collodion. It has an amber colour, and a resinous smell, solid consistence, and a density much the same as paraffin. It melts between 48° and 50° C., and then forms a syrupy fluid, which can be raised to a temperature of 125° C. without any alteration of its properties, so that its sterilization may be assured. It can be applied to wounds at a temperature of about 70° C. without causing the patient the least pain. It becomes solid below 45° C., and has the peculiar property of remaining for some time at a temperature of 40° C. An application will be found to be at about this temperature after being in place for 24 hours. It is, therefore, in a way, a warm application, keeping the tissues at a raised temperature which promotes the proliferation of the cells.

For use, a block of ambrine is broken into small pieces, which are placed in a suitable receptacle over a small fire. At 48° it melts, and the heat can then be raised gradually to 125° . The liquid is then poured into a *bain-marie*, and allowed to cool down to about 70° , at which temperature it is ready for application. It can be sprayed from a spray-producer, or painted with a sterile brush over the whole surface of the wound, which has previously been washed with warm boiled water or normal saline. As the ambrine solidifies, it forms a thin skin over the surface of the wound. On this is placed a very thin layer of sterilized absorbent wool, and a further thin layer of ambrine is spread over this. The part is then covered with a few layers of gauze or wool and a bandage. It is not necessary that these should be sterilized, for the wound is quite sealed up. The dressing is simple, painless, and cheap, but a more important point is that it altogether relieves the pain in the burn. It is left in place for 24 hours, sometimes for 48. After taking off the bandage and gauze, the whole skin is removed in one piece without causing the slightest pain, for there are no adhesions to the wound. In the case of burns, the wound is found covered with a thick, purulent exudation, often smelling very disagreeably. This is removed by gently sweeping off with swabs soaked in boiled water or normal saline. The surface of the wound must be quite dry before the ambrine is applied. A current of hot air is the best method, but sterile gauze answers nearly as well, if applied very gently.

There are no contra-indications for the use of this method. Burns of the third degree, with extensive destruction of tissues, heal up very well. The length of treatment required depends on the general condition, on the extent of the lesion, and on the amount of tissue destroyed. A burn on the face of the second or third degree is usually healed in 21 days. An extensive burn on the arm will take nearly the same time.—(*Journ. de Méd et de Chir. prat.* November 10, 1916.)

nervous system. He always prescribes it when the painful sensations, secretory or motor, are not sufficiently checked by dieting. It is particularly successful in these four syndromes:—1. Painful crises; 2. Gastric hypersecretion; 3. Spasm of the cardia or of the pylorus; and 4. The respiratory, cardiac, circulatory, nervous, and intestinal symptoms due to ærophagia, with which spasm is so often associated.

The drug is always well borne, provided that it is chemically pure. A dose of 2 grammes a day is sufficient, half being taken in the morning and the rest at night. Leven always prescribes an allowance of 300 grammes of fluid for each meal, of which half is taken half-an-hour before the meal, and the other half during the meal itself. When any lesion is present, or symptoms of spasm form the chief trouble, the bromide in simple solution is given with the second part of the allowance. It should be kept in contact with the gastric mucous membrane as long as possible. This result is obtained, as proved by radioscopy, when the bromide is taken in the course of the meal; when taken on an empty stomach, it passes through very quickly indeed.

Weill makes use of a more complicated mixture, suggested by Robin, in hypersthenic dyspepsia, and even in the case of intestinal obstruction with severe colic. A tablespoonful is given, in a little water, at the beginning of each meal.

R. Potassii Bromidi	-	-	-	3iiss.
Sodii Bromidi	-	-	-	3iiss.
Ammonii Bromidi	-	-	-	3i.
Liquoris Arsenicalis	-	-	-	3ss.
Tincturæ Hyoscyami	-	-	-	3iiss.
Syrupi Aurantii	-	-	-	3iij.
Aquam Destillatam	-	-	-	ad 3x.
Misce. Fiat mistura.				

The arsenic appears to increase the sedative effect. It is particularly in very severe spasmodic attacks, which simulate obstruction, a stricture, or a growth, that bromide has a remarkably quick effect. Radioscopy leaves these functional or objective symptoms a matter of doubt, but the bromide treatment cuts them short in eight or ten days, and may obviate surgical measures.

In children, in whom the reactions, set up by gastric reflex, are frequent and severe, Triboulet considers the bromide treatment to be called for very often and to be thoroughly sound, provided a pure salt is used.—(*Journ. de Méd. et de Chir. prat.*, September 10, 1916.)

TREATMENT OF BURNS BY AMBRINE.

At a recent meeting of the *Société de Chirurgie*, Professor Kirmisson showed several patients who had been burnt very severely and had been treated by Barthe de Sanfort with quite remarkable results. Other patients, treated in the same way by Michaux, showed equally good results. These were all obtained from the use of *ambrine*,

There is nothing new in the treatment of fractures, etc. We think mention should have been made of Scudder's pad for fractured humerus, and Stimson's method of reduction of dislocated hip.

Section 4 is concerned with the general management of wounds. The methods employed are old-fashioned; there is no mention of any of the newer methods which have received wide recognition.

There are two good sections on the methods of minor surgery. Section 6 is confined to general surgery, and section 7 to the special branches, viz., the eye, nose, larynx, ear, and teeth. A chapter is devoted to each one of these, and is written by a well-known authority. The illustrations here are very good and illuminating.

Section 8 deals with certain emergencies. The treatment is sufficiently indicated. Abdominal and head emergencies are necessarily disposed of rather shortly, for they lie beyond the scope of this book. A short chapter follows, indicating the methods of general and local anæsthesia.

The last section is concerned with miscellaneous subjects, including a good description of post-operative treatment, and the commoner complications. Urine testing and the value of X-rays are concisely explained, and the book finishes with a useful plan for case taking.

This manual admirably fulfils its purpose; we should, however, have liked to see a special chapter devoted to the subject of sterilization. It is of fundamental practical importance, a fact which is not conveyed by the scattered and scanty allusions occurring in this book.

Notes on Galvanism and Faradism. By E. M. MAGILL, M.B., B.S., D.P.H., R.C.S.I. Pp. 220. London: H. K. Lewis & Co., Ltd. 4s. 6d. net.

It is difficult to see things from other people's point of view, and it is difficult for a medical reviewer to say how this book will appeal to masseuses for whom it is written. It is primarily intended for the use of those preparing for the examination in Medical Electricity of the Incorporated Society of Trained Masseuses, and its scope seems to be limited to that of the syllabus of this examination. This, perhaps, explains the absence of any reference to the Bergonié method of treatment of obesity, etc.

The book seems to fulfil well the purpose for which it is written. As far as is possible technical terms are avoided, and the various explanations and practical instructions are clearly and simply given. We should have preferred to have seen the whole book written on the basis of the election theory instead of the discarded one-fluid theory; there is no use in perpetuating out-of-date ideas. One omission must be noted, as it is dangerous. Aconite ionization is recommended for chilblains, but no mention is made of the dose or of the danger of poisoning from too large a dose of aconitine ions being driven into the circulation.

Reviews of Books.

The Principles of Diagnosis and Treatment of Heart Affections. By SIR JAMES MACKENZIE, M.D., F.R.S., etc. Pp. 248. Oxford and London: Henry Frowde and Hodder and Stoughton. 7s. 6d. net.

THE author, in this volume, gives, in a concise and striking manner, the chief points of his published writings and addresses on heart affections. Readers of Sir James Mackenzie's writings, and those who heard his lectures at the Royal College of Physicians, have become familiar with the forcible manner in which he insists upon the importance of the newer aspects of cardiology. In his enthusiasm, the author evinces some impatience at the conclusions of those who differ from him; he, however, is careful to insist that he does not look upon them as necessarily final.

Symptoms receive more consideration than is usual in text books, while the prominence given to that of pain, both direct and reflex, as aids in the diagnosis and treatment of heart failure, is a marked feature of the work.

Among the many valuable suggestions here found, we note that of giving due weight to the patient's statement of what he complains before entering upon the physical examination. When discussing cardiac dilatation, the author (p. 130) ruthlessly attacks some loudly extolled special forms of treatment, notably the Nauheim cure by baths and exercises, asserting that "over all such forms of cure there is a trail of commercialism." Later on (p. 230), Sir James returns to the charge in a most poignant manner.

The supreme importance of the heart muscle in the causation of failure and other cardiac affections runs as a thread through the book, and its bearing on diagnosis, prognosis, and treatment is dwelt upon under these headings.

We have said enough to show our high opinion of the book, which cannot fail to be of profit to the reader. The use of heavy type before each section, together with a good index, should make reference easy.

Pye's Surgical Handicraft. By W. H. CLAYTON-GREENE, B.A., M.B., B.C., F.R.C.S. Pp. 614. Bristol: John Wright and Sons. 15s. net.

THE seventh edition of this manual shows evidence of having been extensively revised, and contains additional matter and new illustrations.

The book is written for house surgeons and dressers, and is mainly concerned with the practical side of minor surgery. Theoretical considerations are only introduced when necessary to explain the methods adopted. It is arranged in ten sections, with a full index.

Section 1 deals with the surgical treatment of hæmorrhage. Then follows a good description of bandaging and splints, with helpful illustrations.

Pulmonary Tuberculosis in General Practice. By HALLIDAY G. SUTHERLAND, M.D. Pp. xvi + 290, with 6 plates, 42 figures and 9 charts. London: Cassell & Co., Ltd.

IN this volume Dr. H. G. Sutherland has endeavoured to present pulmonary tuberculosis as a systemic rather than a merely local disease. It has been written to supply the needs of the general practitioner: The pathology of the subject is, therefore, dealt with but lightly; on the other hand, the physical signs in both the lungs and other parts of the body are detailed carefully, and so are the methods used in diagnosis. Special chapters are given to pleurisy and hæmoptysis; the last 80 pages are occupied by accounts of various methods of treatment. Dr. Sutherland says that "Tuberculin, while a double-edged weapon, is harmless if used with judgement, knowledge, and care. The same is true of digitalis." He gives a full description of the way in which the chief of the various tuberculins on the market should be used, and he raises a note of warning against the exhibition of tuberculin in doses large enough to produce a febrile reaction or a focal reaction.

Dr. Sutherland writes clearly, and has compressed a great deal of sound and practical knowledge into his book. He is a pupil of Sir Robert Philip, and does full justice to the excellences of the Edinburgh teaching so far as tuberculosis is concerned. He gives a helpful account of the treatment likely to be necessary in the management of pulmonary tuberculosis and its complications. The illustrations are excellent and the book, which is well turned out, may be recommended to the attention of all medical practitioners.

The Art of Anæsthesia. By P. J. FLAGG, M.D. Pp. 341, with numerous illustrations. London: The J. B. Lippincott Company. 15s.

THIS book, which is very well printed and easy to read, has some unusual features. It is more impressive as regards theory and physiology of anæsthesia than as regards instruction in the practical details of anæsthetic administration. One chapter is devoted to the duties of the nurse in connection with patients recovering from anæsthetics, and another to carbon dioxide and rebreathing. Also, there are chapters upon aspirators which are used here so rarely, but which seem to find considerable favour in nose and throat cases in American practice, and there is a short chapter describing charts for recording cases of anæsthesia. In the preliminary examination of patients the author introduces a test which is new to us; two or three breaths having been drawn through the nose, this organ is then punched by the anæsthetist, whilst the patient holds his breath as long as possible. If he cannot do this for 40 seconds, "acidosis or poor cardiac compensation may be suspected." The author's advice bearing upon the patient's feelings when he is about to inhale an anæsthetic, and the anæsthetist's, correct attitude towards him are admirable, though we may hope that the illustrations given to point their necessity are not often matched in practice. Dr. Flagg does

The Treatment of Diseases of the Skin. By W. KNOWSLEY SIBLEY, M.A., M.D., B.C., M.R.C.P., M.R.C.S. Pp. 304. London: Edward Arnold.

THAT it has been found necessary so soon to issue a second edition of "The Treatment of Diseases of the Skin" in itself bears testimony that it has been found useful by practitioners. The new edition has been brought up to date and the latest methods of treatment incorporated.

Part I. deals with methods of treatment, especially by physical agents. The treatment by hyperæmia is described in special detail, and includes a description of radiant heat baths—luminous and non-luminous—and compression hyperæmia, as caused by elastic bands after Bier's method and by suction glasses. A new chapter has been added on radium, while that on X-rays has been extended, and the method of dosage carefully described.

Part II. deals with the treatment of skin diseases, the diseases being arranged in alphabetical order.

For the practitioner whose power of diagnosis is fairly reliable, the book will doubtless prove helpful, though perhaps less so than one of the well-written text books on dermatology, where the treatment can be studied in conjunction with the pathogenesis and symptoms of the disease.

The Mentally Defective Child. By MEREDITH YOUNG, M.D., D.P.H. Pp. 140. London: H. K. Lewis & Co., Ltd. 3s. 6d. net.

ONE of the difficulties a teacher has is to estimate aright the mental capacity of those whom it is his duty to train. Accordingly, a book such as the above, written especially for school teachers, should be exceedingly welcome to all those who make a careful and conscientious study of their charges. It is written by a man of experience; the language is simple, and abstruse medical terms are carefully avoided, so that it appeals readily to the layman. The first chapter deals with the examination of the child, and useful hints are given as to how to gauge the mental powers of the young, special reference being given to normal periods of development, and to what are termed the stigmata of degeneration. There follow excellent descriptions, not too technical, of various types of mental deficiency, such as Cretinism and Mongolism. The moral imbecile is discussed, and some hints are given as to the methods of dealing with this class. In chapter 6, the author discusses what are known as the Binet-Simon tests for feeble-mindedness and some modifications of the series. His criticisms of the tests are sound and well expressed. Some illustrative cases are appended. Chapter 8 is devoted to the subject of the education of the feeble-minded, and the final sections of the book deal with the regulations of the Board of Education and legislation on the subject of mental deficiency in school children. The book, as a whole, is to be highly recommended, and should find a place on the shelves of teachers.

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not see the advantage of warming anæsthetic vapours, and he is opposed to the use of morphia before open ether administration.

His favourite method is that which he describes as the closed drop method, and he has invented an apparatus for its performance which is illustrated and described. He raises and justifies some formidable objections to the method of rectal anæsthesia.

The book is a thoroughly interesting one to send for any student of anæsthesia, and is evidently the work of a man enthusiastically and practically concerned in the advancement of this branch of medical practice.

The Child Welfare Annual. Edited by T. N. KELYNACK, M.D.
London: John Bale, Sons, and Danielsson. Pp. 346. 7s. 6d. net.

THIS annual, of which the present is the first volume, aims at being an authoritative guide and directory for all the workers in the various associations and agencies which are concerned with the betterment of the nation's children. There are a number of original papers dealing with some of the aspects of these questions, followed by lists of the institutions and centres which look after the interests of children and their mothers. It should prove a useful book of reference for all workers.

Maternity and Child Welfare. By E. J. SMITH. London: P. S. King and Sons. Pp. 88. 1s. net.

THIS small brochure is a popular account of the work of the centre at Bradford. It gives a clear and coherent account of the varied activities of the centre, and lays special stress on the necessity of the work, if the future generations in a manufacturing town are to have a fair measure of health and strength. As the writer points out, the main difficulties of the centre are sociological, and though a considerable part of the paper is devoted to the more purely medical aspect, he is quite right in asserting that this is much more a preventive than a curative clinic. The volume gives a good idea of the work carried on, and may prove of assistance to those who are engaged in establishing similar centres in other large towns.

Physics and Chemistry for Nurses. By Dr. A. R. BLISS and Dr. A. H. OLIVE. Philadelphia and London: The J. B. Lippincott Company. Pp. 239. 6s. net.

THE education of the trained nurse in the United States is a very different process to that which is in favour in this country. Here it would be possible for a nurse, not only to obtain her certificate, but also, according to the notions which prevail, to be fully equipped for almost any nursing emergency, and yet to have very little, if any, of the knowledge which is so concisely set forth in the present volume. There is no intention on the part of the present reviewer to enter into a discussion as to which course is likely to produce the best nurse, nor is he going to deny that a nurse who was possessed of all the facts which are here presented would, on occasion, be

extremely useful; he is only concerned to point out to the authors and publishers of the volume that it would be unreasonable to expect any considerable sale to nurses in England, since the book contains so much which they are not required to know.

That being said, there is not much further which requires notice, for there is no pretence on the part of the authors that the volume is anything more than a compilation to serve as a *vade-mecum* for the nurse in training. We may, however, be permitted to note with some astonishment that the chapter devoted to the consideration of disinfection—a subject of the most supreme importance to nurses, not only as regards their patients, but also in respect of their own health—should be limited to a mere list of the methods commonly employed, without any indication as to the principles which underlie those methods, or any account of the differing circumstances in which each should be employed. There are, it is true, some remarks appended to the separate account of the individual agents with respect to their relative advantages and disadvantages, but there is no general statement as to the reasons of preference of method, and the nurse who had no better guide would certainly be led to assume that there is, for example, little to choose between 5 per cent. solutions of phenol and of potassium permanganate. The glossary with which the volume concludes contains items of information with which we are convinced the great bulk, not only of nurses but also of the medical profession, are entirely unfamiliar. The glossary is a most curious mixture of explanations of the obvious, revivals of the old names which have rusted since the days of the alchemists, and of misleading interpretations. Imagine the feelings of a Scottish nurse, when she is gravely informed that “Usquebaugh” consists of “distilled and sweetened tinctures of mace, saffron, orange and citron peels”; or her fury on finding that “Scotch” soda is *impure* sodium carbonate. It may be information that “salt” is sodium chloride; but we can hardly imagine the nurse who does not know it within a few hours of entering her training, and we refuse to believe that, at this period of the world’s history, it can be of any concern to anyone to learn what is the meaning of “sal de duobus,” “sal polychrest,” “sal diurecticus” (*sic*), or “salt of wisdom.” At the same time, this glossary is by far the most original and entertaining portion of the volume.

On the whole, we cannot honestly think that the publishers have been well advised in producing the book on this side of the Atlantic.

Studies in Blood Pressure. By GEORGE OLIVER, M.D., F.R.C.P.
 Edited by W. D. HALLIBURTON, M.D., F.R.S. Pp. 23 + 240,
 demy 8vo. Third edition. London: H. K. Lewis & Co., Ltd.
 7s. 6d.

THIS book opens with a description of apparatus for estimating blood pressure and the author’s phonendoscope. In the following chapter pathological deviations from the physiological are traced, and the effects of spasm of the hypertensive arterial wall are considered. Under Peripheral Resistance we are told resistance

increases as the arteries divide, reaching its maximum in the arterioles. The opinions as to the exact seat of the primary changes in arteriosclerosis are fully considered, as also is the factor of viscosity of the blood in peripheral resistance. The remarks on the rôle of the splanchnic reserve and its bearing on various atonic states have a wide practical application. In the chapter on bio-chemical causes of hyper- and hypotension, the pressor effects of adrenalin and pituitrin are described, while hypotension is considered to be probably due to depletion of pressor products by infective fevers or by fright.

The chapters dealing with the reading of arterial pressure, sources of fallacy, and technique are valuable and suggestive.

The concluding chapters deal with treatment and arteriometry.

The author's hæmacytometer, lymphometer, and hæmoglobino-meter are described in the Appendix. There is a good index.

We have read the book with much interest and instruction, and cordially recommend it to those who desire full information on the subject in a moderate compass.

I. K. Therapy in Pulmonary Tuberculosis. By WILLIAM BARR, M.D., D.P.H. 8vo, pp. 82, with 42 charts. Bristol: John Wright and Sons, Ltd. 3s. 6d. net.

THE letters "I. K." stand for the German word *Immunkörper*, immune substances. The title "I. K." was given by Dr. Carl Spengler, of Davos, in 1907, to a specific for use in tuberculosis, invented by himself, and used by himself with admirable results. I. K. consists of rabbits' blood diluted, acidified with lactic acid, and standardized; the rabbits having been previously immunized by the intramuscular injection of tubercle bacilli, and the bacteria associated with them in the so-called secondary infections of the lungs. I. K. therapy has found a number of enthusiastic supporters, but has been tried and found wanting by many medical men. Dr. Barr gives an account of his experience with I. K., which is favourable, and he tabulates the results obtained in 47 patients treated ambulantly with it since October, 1913, the general results being brought up to January, 1916; he has also used I. K. in a number of other cases. In Dr. Barr's hands, I. K. has yielded valuable results; speaking generally, it makes the patient feel better, lessens the amount of sputum and the fever, causes the accelerated pulse-rate to fall, and leads to an improvement in the patient's weight. It is best given by subcutaneous injection, though it can also be administered by the mouth with success; it is contra-indicated in cases with cachexia or profound anæmia. It may be employed in many dispensary patients in whom the ordinary tuberculin treatment is contra-indicated for one reason or another. Dr. Barr gives excellent accounts of the way in which I. K. should be employed and the difficulties that may be encountered in its use; it may be added that he uses other forms of tuberculin almost as extensively as I. K. in his own work. The book is clearly written, and contains much sound practical advice; it should be read by all who are interested in the specific treatment of phthisis.

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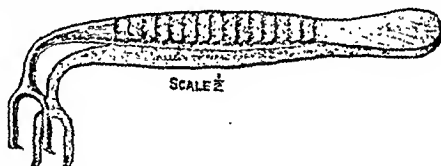
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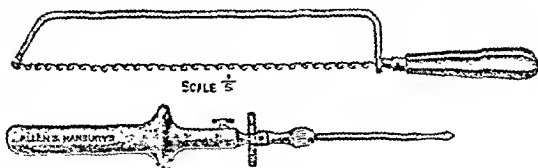


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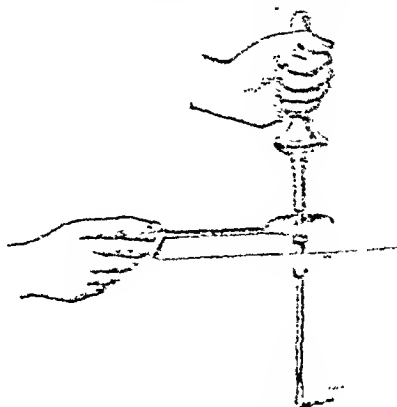
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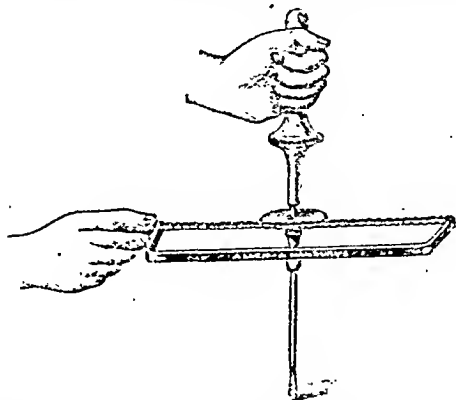
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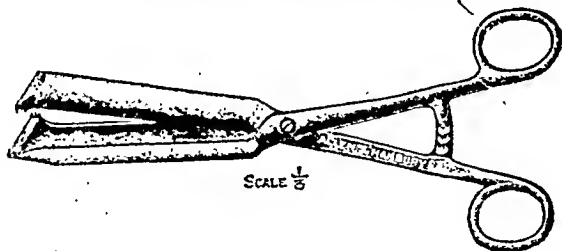


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- BERRY, P. N., M.B., Ch.B. Edin.,** appointed Resident Assistant Medical Officer of the Workhouse and Medical Officer of the Cottage Homes of the Wolverhampton Union.
- BLAIR, J., M.D.,** appointed Certifying Factory Surgeon for the St. Anne's-on-the-Sea District, co. Lancaster.
- BRAITHWAITE, R. W., M.D. St. And.,** appointed a Medical Commissioner of the Board of Control for Lunatics and Mental Defectives.
- BRODRICK, CHARLES CUMBERLAND, L.R.C.P., L.R.C.S., L.M. Edin.,** appointed Medical Officer of Health for the Tavistock (Devon) Rural District.
- CHRISTOPHERSON, C., M.R.C.S., L.R.C.P. Lond.,** appointed to be one of the Medical Referees under the Workmen's Compensation Act, 1906, for the County Court Circuit No. 50.
- COOKE, E. M., M.B. Lond.,** appointed Acting Chairman of the Board of Control for Lunatics and Mental Defectives.
- CROMPTON, K. E., M.B., B.C., Cantab.,** appointed Obstetric House Physician to St. Thomas's Hospital.
- CULLEN, B. T., M.B., B.Ch. R.U.I.,** appointed Certifying Surgeon under the Factory and Workshop Acts for the Ballyhaise District of the county of Cavan.
- DORNFORD, A. C., L.S.A.,** appointed District and Workhouse Medical Officer of the Faringdon Union.
- FERGUSON, J. D., L.M.S.S.A.,** appointed District Medical Officer of the Scarborough Union.
- GARDNER, F. G., M.R.C.S., L.S.A.,** Captain, R.A.M.C. (T.F.), appointed Clinical Assistant in the Ear and Throat Department, Radcliffe Infirmary, Oxford.
- GOOD, ARNOLD SEXTY, L.R.C.P., M.R.C.S.,** appointed Public Vaccinator by the Great Torrington (Devon) Board of Guardians.
- HOLLICK, H. H., M.R.C.S., L.R.C.P. Lond.,** appointed District Medical Officer of the Ashbourne Union.
- HOLLOWAY-OLIVER, S., L.D.S.R.C.S. Eng.,** appointed Dental Clinical Assistant to King George Hospital.
- HOWELL, R. Y., M.B., Ch.B. Glasg.,** appointed Certifying Surgeon under the Factory and Workshop Acts for the Clacton-on-Sea District of the county of Essex.
- HOWELLS, W., M.B.,** appointed Visiting Medical Officer to the Children's House, Toxteth Park Township.
- HUXLEY, Miss FRANCES, M.D., Vtct. (Manch.),** appointed Physician to the Antenatal Department of Queen Charlotte's Lying-in Hospital.
- HYMAN, O. H.,** appointed House Surgeon to St. Thomas's Hospital.
- LLEWELLYN, JOHN, M.R.C.S.,** appointed Medical Officer for the St. Just District by the Truro (Cornwall) Board of Guardians.
- McKENZIE, DAN, M.D. Glasg., F.R.C.S. E.,** appointed Oto-laryngologist to the Hôpital Français, London.
- MACKENZIE, MARION E., M.B., Ch.B. Edin.,** appointed Medical Officer to take charge of the Maternity Centres in the county of Denbigh.
- MILLS, JOHN, M.B.,** appointed Resident Medical Superintendent to the District Asylum, Ballinasloe.
- O'CONNOR, BRIDGET I.,** appointed Assistant Medical Officer of Health for the Borough Maternity and Child-Welfare Scheme at Plymouth.
- O'DRISCOLL, T., M.B., B.S. R.U.I.,** appointed Certifying Surgeon under the Factory and Workshop Acts for the Valentia District, co. Kerry.
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- SHAW, Miss E. A., M.B., B.S. Lond., M.R.C.S., L.R.C.P.,** appointed House Physician to Victoria Hospital for Children, Tate Street, Chelsea, S.W.
- SINCLAIR, G., M.D. Durh.,** appointed Medical Referee under the Workmen's Compensation Act, 1906, for the Sheriffdom of Caithness, Orkney, and Shetland.
- STEVEN, W., M.B., C.M. Edin.,** appointed District Medical Officer of the Pontefract Union.
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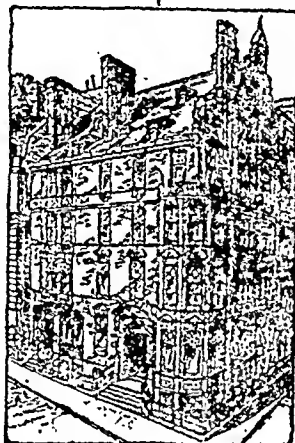
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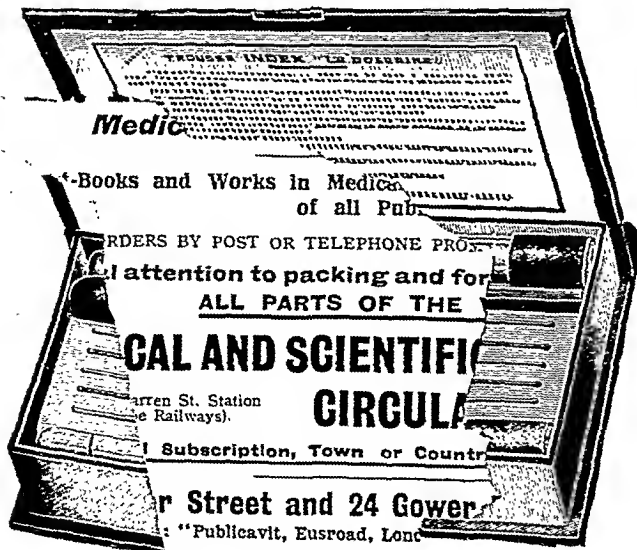
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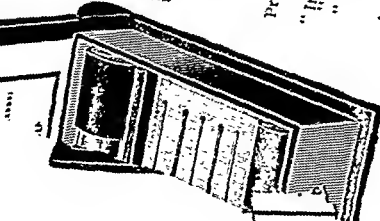


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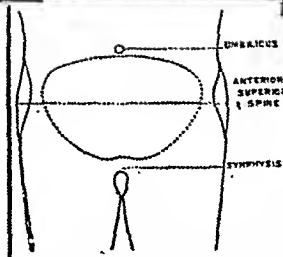
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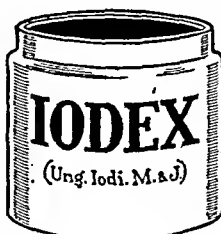
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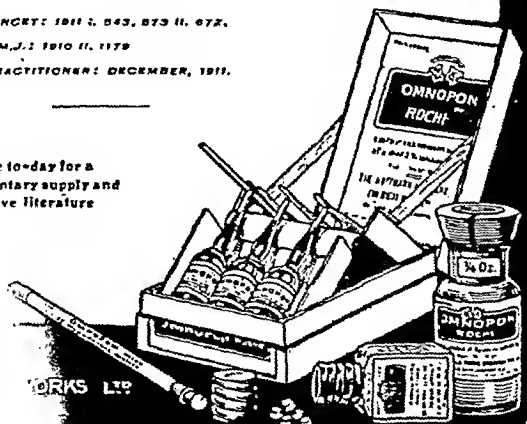
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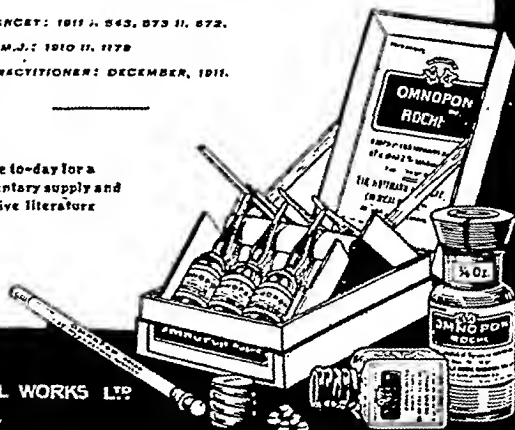
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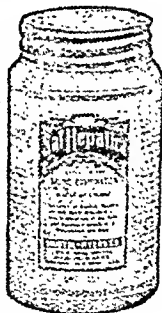
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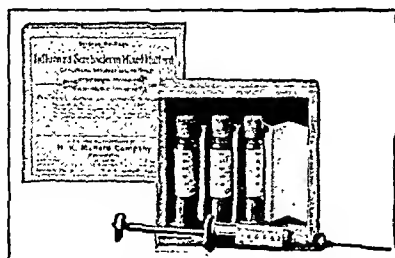
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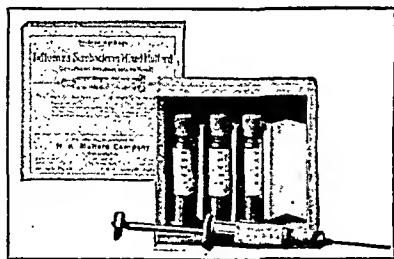


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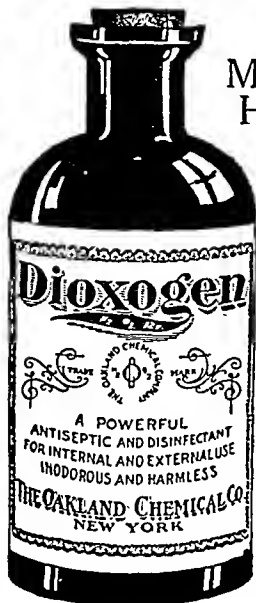
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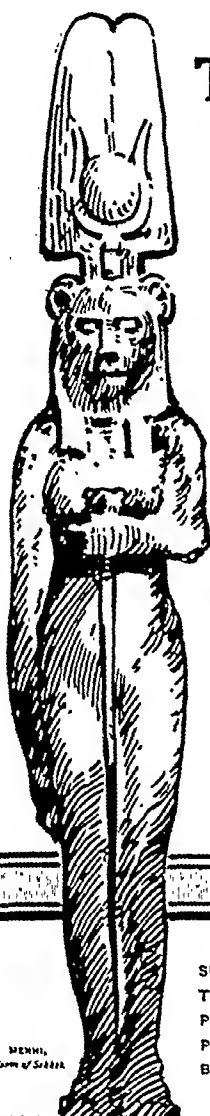
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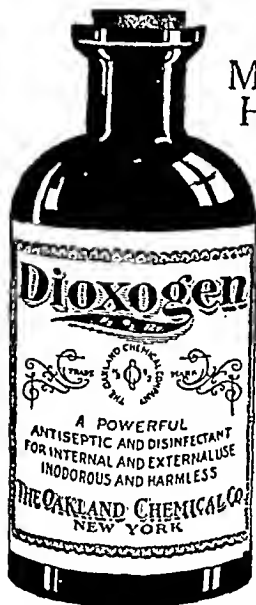
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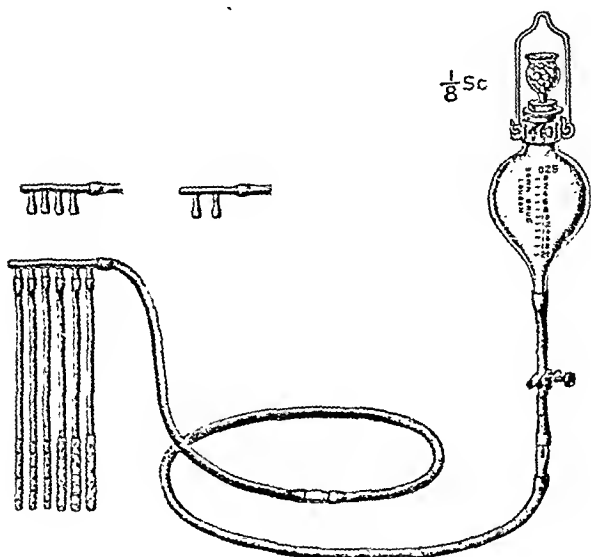
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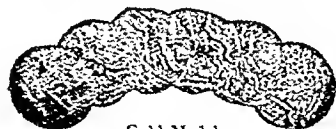


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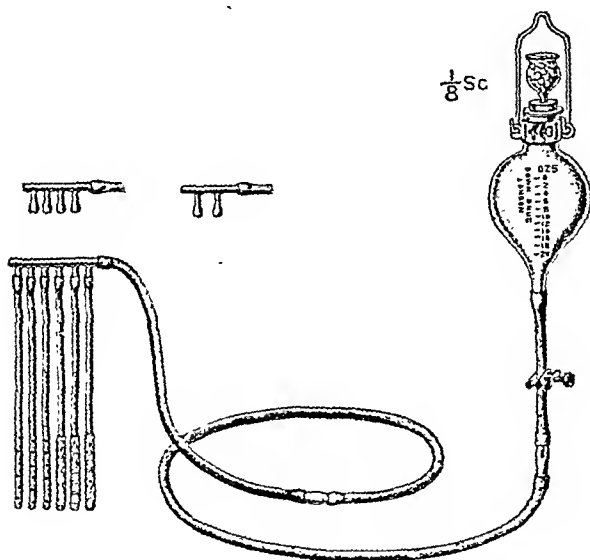
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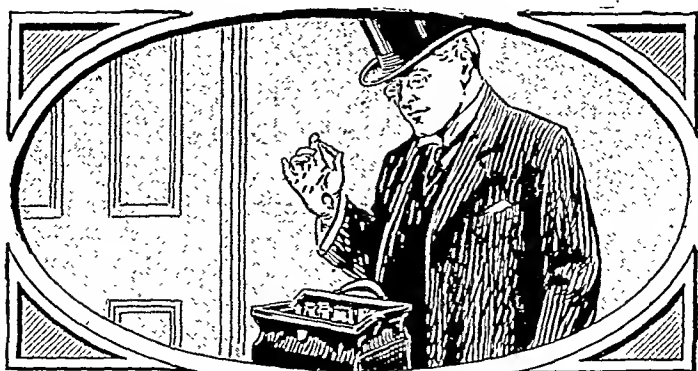
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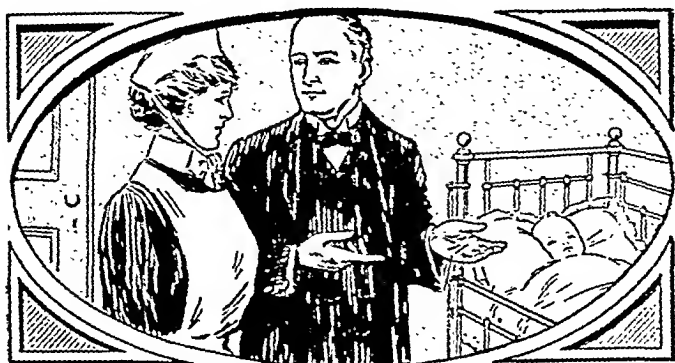
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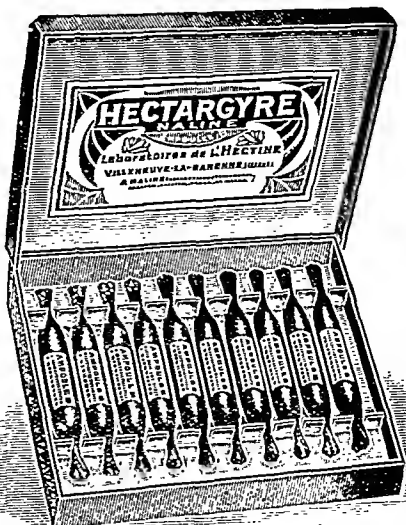
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THE LEADING MONTHLY MEDICAL JOURNAL.

No. 584.—Vol. XCVIII., No. 2.

FEBRUARY, 1917.

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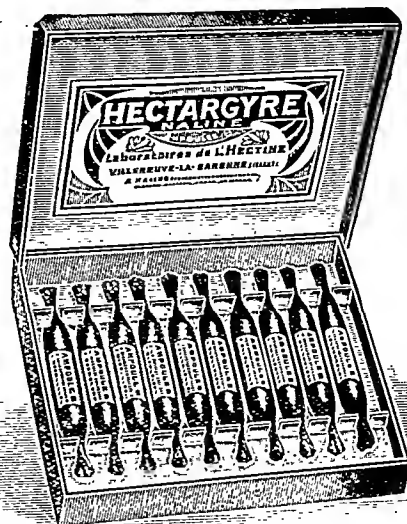
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INTRA-THORACIC ANEURYSM.*

By WILLIAM JAMES FENTON, M.D., F.R.C.P.

Medical Tutor and Dean of the Medical School, Physician, with care of Out Patients and Physician-in-charge of Tuberculosis Department, Charing Cross Hospital; Assistant Physician, Brompton Consumption Hospital, etc.

ALL medical men know what constitutes an aneurysm. It is a dilatation of an artery. Medical aneurysms are almost, though not entirely, confined to the thorax; aneurysm of the abdominal aorta is not very common. The several kinds of aneurysms are usually classified into three—true aneurysms, false aneurysms, and arterio-venous aneurysms.

We are concerned, here, only with the first variety, that is to say, a tumour produced by the dilatation of an artery. A true aneurysm may be fusiform, sacculated, or dissecting. The last is decidedly uncommon, and is primarily due to a splitting of the intima, the appearance of which is remarkable, looking as if it had been cut with a razor, and may present no evidence of degeneration. The blood finds its way through the rupture into the wall of the vessel, and separates it into two layers, producing an appearance as of a double tube; if, as sometimes happens, the blood finds its way round the whole lumen, there is what appears to be one vessel within another. There may be a second rupture into the aorta, or the aneurysm may rupture externally causing the death of the patient.

The true saccular aneurysm is not very common, and this is worth bearing in mind, because it is the form in which healing is most likely to occur. It consists of a local bulging of the vessel.

In a case I once saw there was a local dilatation of the aorta, the size of a tangerine orange. The sac thus produced communicated with the main vessel by an

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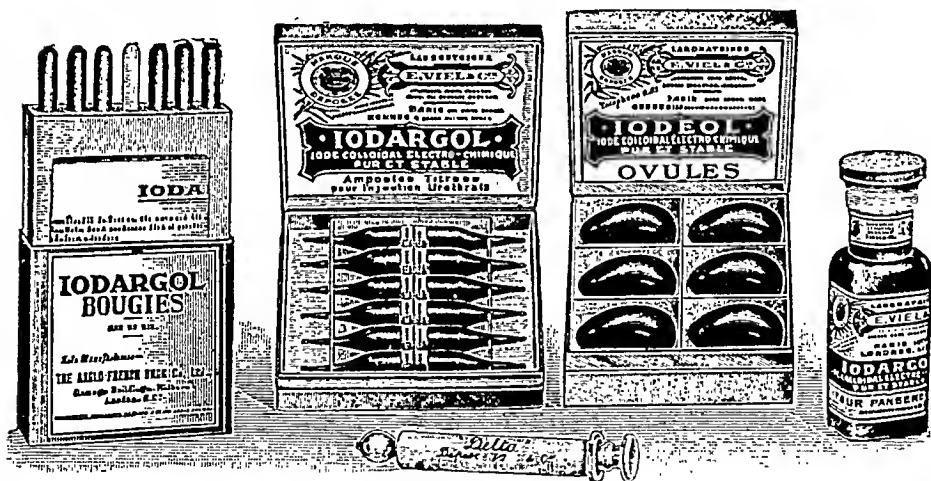
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* Clinical lecture delivered at Charing Cross Hospital.

opening, about the size of a sixpenny piece. In such a condition the blood in the aneurysm is more or less quiescent, and circumstances favourable to the formation of active clot are present. The rule, however, judging from my own experience in the post-mortem room, is that the dilatation of the aorta extends along the ascending and transverse arch, and the sacculations are mere local bulgings.

The positions in which intra-thoracic aneurysm may occur vary. In the first place, it may be confined to one or more of the sinuses of Valsálva, and be thus intra-pericardial. It is a form of aneurysm in which pain and aortic symptoms are prominent. It is easy to understand, in disease associated with softening and atheroma of that part of the aorta which carries the sigmoid valves, that stretching, leading to relative incompetence of the valve with regurgitation into the left ventricle, will follow, and inasmuch as the coronary arteries arise from the same situation, obstruction of their orifices with resulting myocardial degeneration and anginal symptoms are likely to occur. An important feature of aneurysms in this situation is that they do not, as a rule, attain a large size, and by failing to present the usual signs and symptoms associated with intra-thoracic aneurysms are difficult to diagnose. They tend to rupture early, leading to hæmo-pericardium and sudden death. For this reason, this form occasionally enters into medico-legal questions.

The commonest position for intra-thoracic aneurysms to occur is the ascending arch of the aorta. They begin as a rule half an inch or so above the sigmoid valve. Next in order of frequency is the transverse arch. Last and comparatively uncommon is aneurysm of the descending aorta. It happens that of the three cases I wish to discuss, in two the aneurysm is of the transverse arch, and in the other it is of the descending thoracic aorta.

With regard to pathology, it is that of arterio-sclerosis, the main factors being syphilis and strain. By strain, I mean the pressure exerted on the vessel-wall by the contained blood, which need not of necessity be greater than normal. It is really a question of the ratio between the blood-pressure on the one hand, and the resistance of the

vessel-wall on the other. Of the two factors I have mentioned, syphilis is the chief. It is true that the disease is most common among that class of the population whose occupation is laborious and involves heavy strain upon the vascular system; but, at the same time, this class is also most liable to the infection and, owing to circumstances, less able or willing to undergo the prolonged course of treatment requisite. Moreover, there is another very important point. Syphilis may be latent, and its earlier manifestations either absent or so slight as to pass unnoticed. A case in point is one of the three patients under discussion. On enquiry into his past medical history, he was perfectly frank about himself, and admitted irregularities as well as having contracted gonorrhœa, but denied syphilis. He has seen no manifestations, and therefore draws the conclusion, quite reasonable to him, that he has escaped this particular infection. The Wassermann reaction is, however, positive.

Syphilis tends to attack the vessels, and it is a matter of common observation, that disease is liable to attack those structures which are the most subject to strain. The first part of the aorta is the portion of that vessel which bears the full force of the ventricular systole, and therefore supports the highest blood-pressure; it is this part which is the commonest seat of aneurysmal dilatation.

The lesion is a mes-aortitis, consisting of a gummatous infiltration along the course of the vasa vasorum. It must be borne in mind, that it is the middle coat which is mainly concerned in supporting the blood-pressure, and resisting its tendency to over-distend the vessel; under the softening effects of the inflammatory lesion, it is liable to give way. It is evident now, that whether there will be aneurysm formation or not, in the main depends upon the lesion in the media, and its relation to blood-pressure. It is here that the effects of strain make themselves felt. The degree of softening may be no more than what the vessel-wall can successfully resist, so long as no undue stresses are thrown upon it; but when the occupation is heavy with its consequent vascular stress, the weakening effect of the medial lesion is relatively increased, and aneurysm results. Other factors are the extent and chronicity of the inflammatory process. Obviously, when

opening, about the size of a sixpenny piece. In such a condition the blood in the aneurysm is more or less quiescent, and circumstances favourable to the formation of active clot are present. The rule, however, judging from my own experience in the post-mortem room, is that the dilatation of the aorta extends along the ascending and transverse arch, and the sacculations are mere local bulgings.

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is, on the right side of the sternum in the neighbourhood of the second space. The general characteristics are that it is expansile, pulsatile, and that its beat is forcible, corresponding in point of time with the heart's impulse. A solid tumour may receive a communicated pulsation from a subjacent vessel, or may be so vascular as to present a pulsation synchronous with the heart. Again, an empyæma may present as a tumour on the left side of the chest and may receive a pulsation from the heart, but what characterizes aneurysm and distinguishes it from these are the strength of its pulsation and the sensation of force communicated to the hand when placed over it.

Percussion over an aneurysmal tumour is naturally dull. The dulness is, however, very local—punctate. This would be expected, the tumour is rounded and more or less covered by lung; hence, the area of dulness is circumscribed and rapidly shades off.

The auscultatory phenomena are variable. A systolic bruit is an important indication, but, as a fact, it is not such a common event as one is led to expect. It is a little curious why this should be so, because all the conditions favourable to the production of a murmur are present within the aneurysmal sac. A reason may be sought in the presence of clot within the sac.

Another phenomenon of great importance is accentuation of the aortic second sound. When typically present, it is not merely the short snapping closure of the valve cusps, such as is heard in a case of high tension in chronic renal disease, but is more metallic and clanging, more like the sound made by shutting an iron trap-door, and once heard is not readily forgotten. On palpation, a diastolic shock is frequently present, due, no doubt, to the rebound of the aneurysmal wall after receiving the charge of blood from the heart, producing a closure of the aortic valves sharp enough to be felt by the hand. Occasionally, a thrill may be felt. Sometimes a diastolic murmur is present. This is not produced in the aneurysm itself, but is due to regurgitation through incompetent aortic valves. Let me give, here, a word of advice as to the method of conducting a physical examination in these cases, or, indeed, in the examination of any patient. Let him be stripped to

the change is acute and widespread, the greater will be the tendency to dilatation; but when it is sufficiently slow, compensatory processes have time to occur, there is scarring and intimal thickening, but no aneurysm. It is thus apparent that the *fons et origo* of the whole mischief is in connection with syphilitic infection; given strain, that will be a determining factor in its occurrence.

The symptoms associated with aneurysm of the aorta depend upon the presence of a tumour within a confined space. The thorax is, for all practical purposes, a closed box, the sides of which are capable of some degree of movement, but there is no available space in which a tumour can be housed, so to speak, without producing effects upon the viscera normally contained therein. The symptoms of aneurysm, in a word, are those of intra-thoracic pressure.

Pain is very variable. Two of our three cases have experienced severe pain, whilst the third has suffered no inconvenience arising from this cause. Pain is an indication of the possible presence of aneurysm, but it is not pathognomonic, and there are many cases in which it may be absent, as in the one mentioned. In other cases, it plays a subsidiary part in the complaint made by the patient, and in others, notably when the sinuses are involved, it may be very acute and alarming. In part it is due, no doubt, to pressure upon nerves. As an instance, the patient whose aneurysm is of the descending part of the thoracic aorta complains of intercostal neuralgia. In such cases, an area of pain may be felt over the region of the stomach. It is important to remember this, because it may be confused with the pain of dyspepsia. Again, it may be due to the erosion of bone, and the spine, ribs, or sternum may be pressed upon and destroyed in this way. It has been pointed out that pain may be associated with inflammatory conditions, associated with stretching and involvement of the nervous structures of the first part of the aorta.

Before considering the symptoms associated with aneurysm, I must say a word or two about the features characteristic of an aneurysmal tumour which is presenting in such a position as to allow it to be subjected to physical examination. Such a tumour is most commonly seen at the point where the aorta comes nearest to the chest wall, that

cient entry, or its entry is too quiet to produce a respiratory murmur. The lung is resonant on percussion, but the resonance has a certain tympanitic quality, possibly due to the imperfect filling of the pulmonary alveoli. In a case I saw some few years ago, in which there was pressure upon the left bronchus, the lower lobe of the lung was completely collapsed and the pleural cavity half-full of fluid. Stridor is frequently present, as in one of our cases, but is not always to be heard. There is one important feature which is peculiar to cases in which intra-thoracic pressure is due to aneurysm. The symptoms vary from time to time. This is a point of great importance in diagnosis from a solid tumour, in which the symptoms of pressure are permanent, and show no variation. The variability depends upon variations in the size of the aneurysmal sac. While the patient is about following his ordinary occupation, the tumour is at its maximum size, but on putting him to bed, where he remains at rest and under a *régime* tending to reduce vascular excitement to a minimum, the sac shrinks and the pressure effects are to some extent relieved.

Another feature following pressure upon the left bronchus is tracheal tugging; it is present in one of our cases. Its presence depends upon the anatomical relationship of the left bronchus to the arch of the aorta, to which I have just referred. Dilatation may bring these two structures into close contact, so that the pulsation of the aneurysm is communicated through the bronchus and trachea to the larynx. The sign is best elicited by making the patient clench his teeth and throw his head back. The object of this manœuvre is to put the trachea and bronchus on the stretch, so that they come as closely as possible into contact with the sac. On placing the finger and thumb on the cricoid cartilage, a downward tug is felt synchronous with each systole of the heart. This must not be confused with a pulsation communicated by the carotids; in true tracheal tugging, there is a downward pull quite characteristic in reasonably well-marked cases.

There may be pressure upon other important structures, such as certain nerves. A nerve commonly involved is the recurrent laryngeal of the left side, owing to its passing beneath the arch of the aorta; the right passes beneath the

the waist, and no covering of any kind allowed. Let him stand upright, but loosely with his muscles relaxed; above all, there must be a good light in order to look at him carefully from every direction.

Before speaking of symptoms, I will briefly relate the history of the three cases. All three are about 48 years of age. The first man dates his symptoms from lifting heavy casks, five years ago. Shortly afterwards he began to get short of breath, and developed a cough. The second case, likewise, was accustomed to lift weights, the third is that of a general labourer. All three have had syphilis, the first two cases admit infection, and have a positive Wassermann reaction; but the third denies having had syphilis, though admits gonorrhœa 20 years ago. In this case, as already mentioned, the Wassermann is positive likewise. The possible latency of syphilis has been mentioned already, and this is a case in point. In these three patients, the common ætiological factors of specific infection and occupational stress will be noted.

As I have already stated, most of the symptoms arise from pressure, and clearly that aneurysm will give rise to the greatest number of symptoms which is brought most closely into contact with other structures; hence, aneurysm of the transverse arch is in this respect the most important. It is close to the upper opening of the thorax, and, in its immediate neighbourhood, structures of vital importance are closely packed together.

Dyspnœa.—When associated with aneurysm, this may have two or three causes. We must remember that syphilis of the aorta may be associated with arterio-sclerosis elsewhere, so that in some patients dyspnœa may be of cardiac or renal origin. But in cases in which it is due to aneurysm, it is caused by pressure upon some part of the respiratory mechanism, the bronchi, trachea, or possibly the lungs. The bifurcation of the trachea is very close to the transverse arch of the aorta, and the left bronchus passes below it; it is therefore a very easy matter for the dilated vessel, especially if the concave side of the arch is affected, to produce serious pressure effects. In one of these cases, the air entry over the whole of the left lung is so diminished that breath sounds are absent. This does not mean that no air enters this lung, but that there is insuffi-

our three cases, by dilatation of the vessels of the chest, neck, and arms. As a rule, this dilatation is not excessive, but occasionally the varicosity is very great indeed, and the veins stand out as thick, prominent, tortuous cords. More or less well-marked œdema may occur in the area drained by the affected veins.

Pressure upon the œsophagus with dysphagia may be present. For the reason I have already mentioned, it tends to vary in degree. It is usually slight, but may be more considerable. The patient may find his swallowing eased by certain postures, or more especially after a period of rest in bed. The usual warning must not be omitted here, that when a patient complains of dysphagia a sound should not be passed until it has been ascertained that he has not got an aneurysm. The œsophageal wall at the point where it is compressed may be greatly thinned, and the rash passage of a sound may result in rupture of the aneurysm, causing sudden death. It is in cases of this kind that the value of an X-ray examination is so great. In aneurysm of the descending thoracic aorta, pressure and absorption of the vertebræ may occur, and in such cases the spinal canal may be opened. Varying degrees of paraplegia are met with, not necessarily due to direct pressure of the aneurysmal sac upon the cord itself, but following upon interference with its blood supply.

Space does not permit me to go further into other effects of pressure, but the chief have been given. It should be remembered that practically any structure within the thorax may be compressed, including the heart and pulmonary artery.

Before concluding, let me say one word on prognosis. The prognosis of aneurysm is grave, but the patient does not necessarily die within a short time. Healing may take place by the deposition of active clot in laminæ on the walls of the aneurysm, which, in this way, if small and sacculated, may be more or less complete. But this active clot is not organized to the same extent as smaller clots in other situations. If an aneurysm filled with clot be cut across the section has the appearance of the coats of an onion, and between the laminæ blood tends to find its way. In the case I have already mentioned, in which the patient had a typical, sacculated aneurysm, which communicated

subclavian artery and is rarely affected. Pressure upon this nerve gives the aneurysmal cough its peculiar brassy quality. Slight irritation produces in the left vocal cord imperfect mobility. In a normal cough, the cords are closely approximated, while the intra-thoracic pressure rapidly rises with the forcible muscular contraction, and the sound of the cough follows upon their sudden relaxation. When the mobility of the cords is impaired by a slight degree of spasm, the cough has the hard ringing character referred to. Later on paralysis of the cord follows, and the cough disappears. This is not necessarily the cause of the cough itself, which is the result of irritation of the respiratory structures due to the presence of the aneurysm.

Another phenomenon frequently met with is inequality of the pupils. More than one explanation is given of this. It may be due to pressure upon the sympathetic. It will be remembered that the dilator fibres for the pupil leave the cord in the lower cervical and upper dorsal regions to reach the sympathetic chain in the neck. The left pupil is that generally affected. The first result of pressure on the sympathetic will be irritation leading to dilatation of the pupil. Later on, if the pressure is sufficient to produce paralysis, there will be over-action of the third nerve and contraction of the pupil. There is, however, another explanation. It is suggested that pressure on the nerve is unlikely, and that the inequality of the pupil is due to difference of pressure in the two carotids. The iris is supplied with blood by vessels which have a tortuous course and a radial disposition. The effect of an increase or decrease in blood-pressure, under such circumstances, will be to lengthen or shorten the course of these vessels as the case may be, producing in this manner an alteration in the size of the pupillary aperture. Finally, the inequality may not be due to aneurysm at all. The syphilitic patient is liable to have a combination of troubles, and alteration in the pupil may be due to chronic nervous disease, as, for instance, locomotor ataxy.

Other evidence of pressure on structures within the thorax will be seen in the case of the veins. Pressure on the veins is, perhaps, not quite so common as might be expected, but when it occurs is well shown, as in one of

our three cases, by dilatation of the vessels of the chest, neck, and arms. As a rule, this dilatation is not excessive, but occasionally the varicosity is very great indeed, and the veins stand out as thick, prominent, tortuous cords. More or less well-marked œdema may occur in the area drained by the affected veins.

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with the lumen of the aorta by a small opening, the aneurysm had projected into and excavated the apex of the right lung. The patient complained of hæmoptysis, and examination revealed dulness with diminished breath sounds. Pulmonary tuberculosis was diagnosed. Death from hæmoptysis subsequently occurred, when there was found the aneurysm I have just mentioned. It was completely filled with laminated clot, into which the blood had worked its way between the laminae, and so caused the hæmoptysis. Thus, though an aneurysm may be completely filled with clot, it does not follow that a final cure has been produced. In cases in which the arch of the aorta is dilated and the saccules merely consist of local bulging, healing practically never takes place, though masses of clot are frequently found, more or less, adherent to the walls. With regard to the length of time a patient may survive after a diagnosis has been made, it will obviously depend upon many circumstances, but chiefly upon the nature of the structures compressed. One patient with a large aneurysm of the arch of the aorta, which eroded and projected through the sternum, lived twelve years. Another, the patient—a policeman—who ascribed his aneurysm to a blow received in a scuffle, lived ten years, finally dying of general paralysis. Cases have been recorded in which the aneurysm has ruptured externally, and yet the patient has survived for some years.

But, despite these instances of comparative longevity, aneurysm is a grave condition, and in attempting to give prognosis all the factors must be taken into consideration. Much depends upon the pressure effect, and how far other organs are involved in the syphilitic process. The occupation, general surroundings, and social position of the patient must be taken into account, but when all this is done, it is still advisable to be very guarded, and not to lay down a definite time within which the demise of the patient may be expected.

EPIDEMIC NEPHRITIS.*

By W. LANGDON BROWN, M.D., F.R.C.P., CAPTAIN R.A.M.C. (T.F.).

*Physician to the Metropolitan Hospital and Assistant Physician to
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ACUTE nephritis has not been a common disease, either in civil or military practice. At St. Bartholomew's Hospital, with 7,000 medical admissions a year, there was only an average of five cases a year among men of military age, during a period of five years. In wars it has been rare until now, with the important exception of the American Civil War, in which there was a very considerable outbreak of the disease. I have drawn up a curve, by adding together the cases classified as general dropsy, Bright's disease, and inflammation of the kidney. This is necessary, for the diagnosis of Bright's disease, which was not made until September, 1862, gradually replaced that of general dropsy, which was discontinued in December, 1863. The curves will, therefore, include cases of chronic nephritis, but this would not affect the extraordinary rise which took place between March, 1862, and March, 1863. The case-incidence per thousand troops rose earlier in the armies of the central region, and reached a higher level than that for the rest of the army. There was no similar rise in subsequent years. In the central region, the incidence reached 1.5 per 1,000. Throughout the war there were 14,187 cases.¹ It is of great interest to recall that in the American Civil War, the military conditions resembled those of the present war, in some important particulars. There was the sudden dash of the Confederates northwards, which was checked, and followed by a prolonged trench warfare.

The present epidemic in the British Army is not assuming such dimensions as this. It is impossible to give the full figures at present, but up till the end of June, 1915, 1,062

* A paper read to introduce a discussion at the Medical Society of London. (For discussion, see p. 127 onwards.—Ed.)

¹ This curve was published in the *Transactions of the Royal Society of Medicine* (Medical and Therapeutical Sections), March, 1916.

cases had occurred. Very few were reported until February, 1915, in which month 72 cases occurred, increasing to 326 for the month of June. The returns continued to increase for some months, but in 1916 there was a steady fall again.

I cannot find that the Belgian Army has been affected, and the French Army had suffered little until about July, 1915.

In the Mediterranean area, I did not meet with records of cases previous to the movement of troops from France to that area. Moreover, I am informed that cases of nephritis have only occurred in those districts in the Mediterranean area to which troops from France had been moved.

From a discussion on the subject in Vienna, we learn that there has also been an outbreak among the German and Austrian troops, and that it began at about the same time as in our Army.

The cases upon which I base my remarks fall into two groups:

- (1) A series of 58 cases investigated by me at St. Bartholomew's Hospital, with the aid of Dr. Mackenzie Wallis and Dr. Trevan, whose services were kindly made available by the Medical Research Committee.
- (2) A series of 108 cases, under my own care mostly, but some under that of my colleagues, at the First London General Hospital. For many of the statistics of this group, I am much indebted to the Resident Medical Officer, Dr. Atkinson, who has displayed, throughout, the utmost energy and interest in the subject.

Of the 166 cases, 9 came from the Mediterranean area, the rest from France or Flanders.

ÆTIOLOGY.

It is a curious fact how few officers have been attacked. In this series, only five were officers. In addition to those, I have seen two other cases in officers: one a Medical Officer, the other a Brigadier-General who was in the habit of going into the trenches for long periods of time. The distribution of cases among the various units was curiously haphazard.

Another interesting point is the length of time that men had been out before becoming attacked. Only one case had been in France for less than a month, but he gave a previous history of scarlet fever.

The remainder showed the following :

Number of Months.				Number of Cases.	
1	-	-	-	-	4
2	-	-	-	-	6
3	-	-	-	-	9
4	-	-	-	-	7
5	-	-	-	-	7
6	-	-	-	-	7
7	-	-	-	-	9
8	-	-	-	-	5
9	-	-	-	-	3
10	-	-	-	-	3
11	-	-	-	-	2
12 or more	-	-	-	-	3

It would appear as if the cause, whatever it may be, had to operate, in most cases, for some little time before becoming effective.

I will now proceed to discuss the various causes suggested for this outbreak.

I. Exposure.—This epidemic has, I think, disposed of the hallowed tradition that exposure is a very important cause of nephritis. While the troops were enduring much cold and exposure during the bad winter of 1914-15, there were but few cases of nephritis; it was not until the weather was better that the disease assumed epidemic proportions. The cases continued to increase into the summer, when the violent fluctuations of temperature in the spring were past. The incidence in the American Civil War was strongly against a climatic cause, for this could not account for an outbreak which started in March and lasted for a whole year, but which was not repeated in subsequent years of the war. However, I made careful enquiry as to exposure in the 166 cases. In 22, the men were sure they had been specially wet before the illness began, whereas in the remainder no such history could be obtained. I doubt, very much, if mere exposure damages healthy kidneys. On the other hand, I do think that exposure will exacerbate chronic nephritis, and I have seen a return of albuminuria sometimes when an apparently convalescent

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or through being exposed to bacterial infection, either by direct invasion or by the establishment of an infective focus in some other part of the body. The case of South Africa, where the diet was similar, they explain away by saying that the protein content was lower; that, on the average, the troops had more physical exertion, and that cutaneous excretion, which is at its best in a dry atmosphere, would afford the kidney considerable relief.

It would be important to know whether similar dietetic conditions obtained in the American Civil War. It would also be useful to know whether the rations of our troops, while training in this country, differ widely from those which they get while fighting in France, for, otherwise, it is difficult to see why nephritis should be rare under the former conditions, and common under the latter. They explain the French having less nephritis by the lessened protein diet they take, though this would not explain why nephritis began to increase in the French troops in July, 1915, four months after it had started to rise among our troops. Again, if protein excess had anything to do with this nephritis, we should expect the presence of intestinal toxæmia. But Mackenzie Wallis found no evidence of this, the excretion of ethereal sulphates and of urobilin being distinctly low. Also, if the establishment of an infective focus in some other part of the body is an important factor, wounded soldiers should be specially liable to nephritis; but they are not. Only one of my cases was wounded, and I have only seen two cases of nephritis coming on in a wounded soldier; one of these came from Salonica, and his nephritis was of a quite different kind. So that, altogether, I do not think the dietetic explanation adequate.

5. *Suppressed Scarlet Fever.*—The French Army surgeons have suggested that the disease was due to a suppressed form of scarlet fever. It is interesting to note that very few, if any, cases occurred among the Indian troops in France, and the natives of India are said to enjoy comparative immunity from scarlet fever. Sore throat at the outset was complained of by 45 (27 per cent.) of my cases, but I have since come to the conclusion that this soreness is generally secondary to the cough, which is common at the outset. Otitis media, so common

patient got cold. Probably, the theory of nephritis starting from cold obtained currency in some such way. The trend of modern research has been to discountenance climate as a cause of epidemic disease, though past beliefs are enshrined in such names as malaria and influenza.

2. *Water-Supply*.—There is the possibility of the water having been derived from an unwholesome source; or that chlorination of the water or some metallic poison derived from galvanized water-carts or water-bottles might have been responsible. My cases lent no support to any of these hypotheses. The sources from which the men had obtained water were extremely variable. Moreover, some had been careful about boiling the water, and others had not. In some cases, the water had been chlorinated, in others it had not.

3. *Lead*.—Dr. C. P. White¹ has suggested that the lead in the solder used in the tinning of foods is the cause. He found lead in the urine of four cases of trench nephritis, and tin in one. Nevertheless, I doubt this being responsible. If so, why was nephritis so rare in South Africa, where a still higher proportion of the foods was tinned? I am also informed that at Suvla Bay, where the troops had mainly to depend on tinned foods, nephritis was very rare. Another point against this explanation is, that in cases of nephritis undoubtedly produced by metallic poisons, the urine has been shown by Mackenzie Wallis to have different characters. In nephritis of metallic origin, white corpuscles are scanty, the albumen-to-globulin ratio is 3 to 1, and the proteins are optically active. In trench nephritis, white corpuscles are abundant, the albumen-to-globulin ratio is 5 or 6 to 1, and the protein is almost inactive optically.

4. *Diet*.—Captain J. W. Macleod and Medicin-Aide-Major Ameuille² conclude that the chief factor is the excess of protein in the diet, combined with the lack of fresh vegetables. Their view is, that the kidney has its resistance lowered by a slightly scorbutic condition, and gives out when, in addition to this, it is required to make an excessive metabolic effort, owing to a high protein diet,

¹ *Lancet*, May 13, 1916.

² *Lancet*, September 9, 1916, p. 468.

which precedes a relapse suggest an infective agent. The way that the disease spread to the French troops four months after it attacked the English troops is also suggestive. Still more so is the way it spread into those parts of the Mediterranean area where troops had been moved from France. In one case, it occurred in a patient who had never been in France, but who was nursed in a ward with cases of nephritis. He was admitted on March 20, 1916, with rheumatic fever and endocarditis, and developed nephritis, of the trench variety, on May the 6th. It gradually cleared up, and I suggest that he must have contracted it by direct infection. The only other cases I have seen of this disease among soldiers who had not been at the Front were among orderlies working in base hospitals.

The next step towards the elucidation of this point was to ascertain by chemical tests whether the nephritis was of the infective or toxic type. Some authorities claim that the infective type is glomerulo-tubular in distribution, while a toxic nephritis, such as that produced by corrosive sublimate, is mainly tubular. I may say I am rather sceptical as to the value of this distinction, but, so far as it is valid, the results obtained by Dr. Mackenzie Wallis and Dr. Trevan would point to the involvement of both glomeruli and tubules.

Various methods were then tried to detect the nature of the infection.

(a) *Blood Cultures* were sterile.

(b) *Cultures from the Urine*.—Catheter specimens were obtained from 21 consecutive cases, and cultures made. 18 proved to be sterile. From the three remaining cases, *B. Coli* was obtained, but in two of them only with difficulty. In a later investigation, paratyphoid *B.* was found in one case. In several other cases, organisms, usually streptococci and staphylococci of low virulence, were found, but it was noted that this only occurred when the urine had been rendered alkaline by citrates and bicarbonates. On rendering the urine acid again, they speedily disappeared, and I can hardly think they played any part in causation.

(c) *Throat Cultures*.—These were made from all cases in

in scarlet fever, developed just before the œdema in two cases. Mackenzie Wallis has made a comparative study of trench nephritis and scarlatinal nephritis, and has shown many points of similarity, both in the lesions produced and in the character of the urine. But I do not suggest that the two are identical. If the same percentage of nephritis occurred in this presumed suppressed scarlet fever as in the ordinary type, this would mean that there had been at least 10,000 cases of suppressed scarlet fever among the troops, which appears to me an impossible assumption. Moreover, even in scarlatina without eruption, desquamation follows, which has not been observed in these cases.

6. *Other Suggestions.*—In the discussion held at Vienna various causes were suggested, including the deliberate *taking of cantharides* or *chronic acid* by soldiers in order to render themselves unfit for further service. The combination of *alcoholism* and *exposure* was also suggested. *Dysentery* and *typhoid* were suggested as predisposing causes. But other speakers called attention to the lack of agreement between the curves of incidence and the intestine and kidney conditions. Moreover, dysentery and typhoid were rife in South Africa, yet nephritis was rare. Some speakers regarded the condition as an *exacerbation of chronic nephritis*. This would only apply to a few cases. In my series there was a previous history of nephritis in 13. There is no reason to suppose that a larger proportion of men with damaged kidneys were engaged in this war than in any other wars. *Anti-typhoid inoculation* has also been held responsible, but there is no evidence that the injection of immune bodies can excite nephritis; nor is this consistent with the rarity of the disease in South Africa and among the inoculated troops training at home. Occasionally nephritis has followed *trench fever*, but not more commonly than could be explained by coincidence.

7. *A Specific Infection.*—The rapid increase in the number of cases in this war and in the American Civil War, starting about March in each case, and the close similarity between the individual cases, suggest some common cause, and one not operative in all wars. The simplest explanation would be a specific infection. The febrile beginning and the fever

which precedes a relapse suggest an infective agent. The way that the disease spread to the French troops four months after it attacked the English troops is also suggestive. Still more so is the way it spread into those parts of the Mediterranean area where troops had been moved from France. In one case, it occurred in a patient who had never been in France, but who was nursed in a ward with cases of nephritis. He was admitted on March 20, 1916, with rheumatic fever and endocarditis, and developed nephritis, of the trench variety, on May the 6th. It gradually cleared up, and I suggest that he must have contracted it by direct infection. The only other cases I have seen of this disease among soldiers who had not been at the Front were among orderlies working in base hospitals.

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which sore throat was complained of, and in several in which no such complaint had been made. Streptococci grew in abundance, sometimes in practically pure culture. Pneumococci were found in 5, and diphtheroids and micrococcus catarrhalis were also found in some cases. But when Dr. Canti made control cultures from the throats of wounded soldiers who had not got nephritis, and 10 male civilian patients of military age suffering from various surgical diseases, he found that the soldiers' throats were, as far as bacteriological examination went, in a healthier condition than were the civilians' throats; while the throats of the soldiers with and without nephritis were closely similar. He also found that the streptococcal anti-bodies in the blood of the nephritic cases were not in excess, which is against the existence of a recent streptococcal infection.

Investigations were next made as to infection by an ultra-microscopic filter-passer. Dr. Mackenzie Wallis produced a definite illness in rabbits and monkeys after an incubation period of eight days by injections of urine prepared so as to be free from bacteria, but containing any filter-passer present. Although he only succeeded in producing albuminuria twice, and even then not definite evidence of a true nephritis, these results demand consideration, for the latent period of eight days excludes a mere chemical cause for the illness. Moreover, heating the urine to 55° C. rendered it inert in this respect. This period of eight days corresponds fairly well to the incubation period which has been estimated clinically in some cases. It would suggest that in the urine there is an infective organism, ultra-microscopic and passing a filter, destroyed by heating to 55° C., but not tending to produce nephritis in the animals selected. In this connection the results of the Wassermann reaction are of interest. The reaction was positive in 18 out of 56 cases, being strongly so in 4 and feebly so in 3. This may mean that men damaged by syphilis are more liable to nephritis, or that the positive reaction was not due to the spirochaeta pallida, but to some other animal infection, such as a filter-passer is

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MORBID ANATOMY.

In a very early case, investigated by Professor Andrewes, there was intense congestion with slight swelling and irregularity of the tubular epithelium. Captain Abercrombie found, in an early fatal case, desquamative tubular nephritis, the glomerular changes being inconsiderable. In a later case, Professor Andrewes found that all the glomeruli showed signs of inflammation, and there was extensive damage to the convoluted tubules. The interstitial tissue was œdematous, and infiltrated with lymphocytes and polymorphs. There was no fibrosis or pyelitis, and no micro-organisms could be found. Lieutenant Dunn's recent observations on the thrombosed condition of the glomeruli are also important.

SIGNS AND SYMPTOMS.

Incubation Period.—A man who went to France for the first time on June 1, 1916, developed œdema and dyspnœa on June 6. Another man, home on leave, developed nephritis on the 8th day of his leave. The Brigadier-General (previously referred to) had been home on sick leave, and developed nephritis on the 15th day after he had returned to the trenches. These results would suggest that the incubation period, if the condition is due to an infection, may be something between 6 and 15 days.

Premontory Symptoms.—Captain Abercrombie finds that about half the cases have premonitory symptoms: either (1) bronchitic, the commonest variety, (2) febrile, or (3) abdominal pain and vomiting.

In the majority of the cases, the first thing the patient noticed was the œdema, which usually started in the face and legs, and sometimes remained curiously localized, though more frequently it became general. Œdema was almost a constant symptom, being present in 97 per cent. of the cases, and in some of the remainder there was a history of previous nephritis. The œdema usually lasted only a few days, though sometimes there was a return of it later on. One of the most striking points was the frequency of dyspnœa as an early symptom. It was definitely present in 126 cases (76 per cent.). As a rule, the

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heart does not supervene, for, if there is such a wide variation between systole and diastole, the artery is not exposed continuously to a great strain.

An interesting fact, pointed out to me by Dr. Atkinson, is that most of the cases showing very greatly raised pressures—190 to 210—occurred in men who had been plumbers or painters in civil life before entering the army. In them, arterial degeneration, and therefore high blood-pressure, might be expected to occur.

There was a great variability in the amount of urine secreted. Often it was markedly increased, while the disease appeared to be fairly acute, *i.e.*, there was hyposthenuria, or an inability to secrete concentrated urine. It was certainly a more pronounced feature of these cases than in acute nephritis met with in civil practice. One case showed some uræmic symptoms while excreting 120 ozs. of urine per day. Here the failure to excrete solids was very marked. Red blood corpuscles were found in 102 of the 166 cases. The amount was very variable; sometimes the urine was bright red with blood, sometimes merely smoky, and often chemical and microscopical tests were needed to detect blood. A common feature was the settlement of a flocculent reddish-brown precipitate, in which alone blood could be found. White corpuscles were present in 79 cases. Sometimes only a few were found, but usually they were more abundant than is the rule in acute nephritis. Isolated renal cells, transitional epithelial cells, squamous cells from the lower urinary tract, and cells from the genital tract, were commonly found also in the centrifugalized deposit. Casts were found in the great majority of the cases. By far the commonest thing was to find a mixture of epithelial, granular, and hyaline casts. Blood casts and fatty casts, on the other hand, were uncommon. The frequency with which the different forms were found may be tabulated thus:—

Blood casts	-	-	2	Granular casts	73
Epithelial casts	-	-	37	Hyaline casts	58
Fatty casts	-	-	7		

Crystals were rare in the urine; calcium oxalate was found twice, and uric acid once. The rarity of organisms in catheter specimens has already been referred to.

As to eye changes, Mr. Jessop found that retinœdema

shortness of breath started at the same time as the œdema, but did not last so long. The alveolar CO_2 was determined by Dr. Trevan in five cases during the dyspnœa. In three it was normal, while in the remaining two it was reduced from the normal 5 per cent. to 3 per cent. Since dyspnœa due to acidosis is always associated with reduction of alveolar CO_2 , and uræmic dyspnœa is of this type, it would appear that the shortness of breath was not always associated with acidosis, uræmic or otherwise. Dyspnœa is not usually regarded as a common feature of acute nephritis apart from uræmia or cardiac failure. But the majority of these cases were not so ill that either the kidney or heart was failing, and none of them showed signs of cardiac dilatation.

The close agreement between the onset of œdema and dyspnœa suggests that the outpouring of fluid into the lungs or pleural cavity may have been responsible for the shortness of breath. This is supported by the frequency with which a cough and bronchitis also occurred.¹ Some of the cases showed a return of respiratory distress after their journey from France. In general, I might say that they seemed to stand the journey rather badly, and several times there was a marked drop in the secretion of urine for several days afterwards. Captain Abercrombie relates the dyspnœa to wide fluctuations in the blood-pressure, which he observed. We have not observed this in the cases in which we have looked for it, but then we do not get our cases as early as he does. We found the blood-pressure to be very variable, being raised in some cases but not in others. In my series the commonest diastolic pressure was 70 mm., while the commonest systolic pressure was 140 mm. There was a very wide variation between the systolic and diastolic pressures. The commonest variation was 60 mm., and the average variation was only about 10 mm. less than the diastolic pressure. This is certainly much greater than is usually met with in nephritis or in healthy individuals. It means that the pulse-pressure is not as great as the systolic readings might lead one to expect. This may account for the fact, observed both in this country and by Schlesinger in Vienna, that in the large majority of cases hypertrophy of the

¹ Lieutenant Dunn has shown actual changes in the lungs similar to those seen in gas-poisoning.

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was the commonest change. Plaques were seen and occasionally detachment of the retina. Hæmorrhages were not common. He considered the changes typical of a toxæmic process. They were not permanent. In my series, definite retinal changes were found in 18 per cent. Convulsions occurred in seven cases (4 per cent). They closely resembled uræmic fits, and generally yielded quickly to venesection. Dr. Canti tells me, however, that in those cases in which he had the opportunity of estimating the urea in the cerebro-spinal fluid it was not raised, as is usually the case in uræmia.

I have tabulated the relative frequency of the different symptoms as follows:—

SYMPTOMS.

	Per Cent.		Per Cent.
Œdema -	97	Vomiting -	24
Headache -	77	Retinal changes -	18
Dyspnœa -	76	Diarrhœa -	16
Pains in the back	60	Nausea -	12
Cough -	51	Fits -	4
Sore throat	27		

Other symptoms which have occasionally been observed by Captain Abercrombie are herpes and parotitis, both of which suggest an infective origin. Milkiness of the blood serum, referred to by Bright in his original account of the disease, was not observed in any of the 56 cases in which the blood was drawn for Wassermann's reaction, but was present in a fatal case under Lieut.-Colonel Calvert's care. Captain Abercrombie found that in 5 per cent. of his cases there were symptoms referable to the lower urinary tract, either the pelvis of the kidney, the bladder, or (less frequently) the prostate. I only had one definite example in this series, which came on after enteric, but otherwise agreed with his description. Since then, I have had one other case.

COURSE AND PROGNOSIS.

The outlook as to life is very favourable. Only 2 of these 166 cases were fatal, and in few other cases did life ever appear to be in danger. Most of the men felt quite well as soon as the œdema subsided, though some complained

of headache, cough, and digestive disturbances for a week or more. Yet many of those who felt and looked quite well, were still passing albumen, blood, and casts. As they recovered, the albuminuria often became intermittent, and there has been a curious tendency to remission and relapse. Often the patient has been able to tell from his own sensations, whether the albumen has returned or increased. It took as long as 14 weeks for the albuminuria to cease in some cases, and others continued to pass blood and albumen even five or six months after the onset.

I am afraid that our original views as to complete recovery must undergo modification. I assume that we only get the more protracted cases sent home from France. A patient who developed the disease immediately after he returned from France on leave, and who was admitted to hospital on the second day of the disease, was free from albuminuria on the fourth day. My general impression is, that either the condition clears up within three weeks, or, if this does not occur, he will have albuminuria for several months at least. Yet even then recovery may, apparently, be complete. One patient who passed blood for five months was reported seven months after his discharge from the Army to be seriously ill again. I admitted him to the civil wards of St. Bartholomew's Hospital, but found that he merely had an acute tonsillitis, and that his urine was now normal in every way.

I have seen so many men with severe symptoms who had had a previous attack, and had been sent back to the Front, that I have come to the conclusion that any patient who has had hæmorrhagic acute nephritis is unfit for further service abroad. My own practice at the present time is never to recommend such a case for foreign service, and if a man has definite albuminuria at the end of four months, to recommend his discharge from the Army altogether.

The diastase reaction in the urine is a valuable aid to prognosis. Not only are those cases worst in which the diastase output is lowered or absent, but if the lowered output persists after the albuminuria has ceased, the patient seems liable to relapse. A case, therefore, cannot be regarded as cured until the diastase output has returned to normal.

TREATMENT.

Some years ago, I ventured to lay down certain rules in

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This contains, on an average:—

Protein	-	-	-	-	95 grammes.
Fat	-	-	-	-	92 grammes.
Carbohydrate	-	-	-	-	365 grammes
Caloric value,	2,690.				

I may add that mutton and fish were allowed on alternate days.

(2) The second point I urged was, that stimulating diuretics are bad as long as there is any degree of acuteness, and that flushing-out of the kidney is not always advisable or practicable. Theocin is regarded as the least irritating of the stimulating diuretics, and is claimed to have the power of increasing the permeability of the kidney. It was tried in three cases. In the first, it had a decided diuretic effect, and raised the diastase content of the urine from 0 to 20. In the other two cases, it had no effect on the diastase, and only a slight diuretic action. One of these cases, also, had a return of hæmaturia when the theocin was given. Theocin, therefore, like caffein, diuretin, and theobromin, has an irritant effect as well as a diuretic action. It is an unsuitable drug as long as there is any degree of acuteness of the disease, as, I think, are all the drugs of that class.

An instance of the failure of stimulating diuretics, and the apparent success of the saline diuretics, is seen in the following case. A patient was taking 10 grs. of diuretin and 5 m. tincture of digitalis three times a day. His average output was only 30 ozs. of urine. On replacing this by acetate of ammonia and sodium bicarbonate, the output rose to 92 ozs. On adding 5 m. tincture of digitalis to this, in order to see whether the diuretin or the digitalis was to blame, the output rose to 110 ozs. I am of opinion, therefore, that the diuretin, so far from acting as a diuretic in this case, diminished the output by irritating the kidney.

As to the impracticability of flushing out the kidney in cases of acute nephritis, the following instance is interesting: A patient with œdema and ascites was drinking 4 to 5 pints of fluid a day; his output was 2 to $2\frac{1}{2}$ pints of urine daily. I then restricted him to 2 pints of fluid a day. The output then actually rose to $2\frac{3}{4}$ pints, the Esbach result remained the same, and the œdema and the ascites diminished.

the treatment of nephritis, the justice of which my experience in this epidemic has confirmed.

(1) In acute nephritis, a milk diet is not very suitable, because of its relative richness in protein, while in chronic nephritis the tendency has been towards too much restriction as to the quality of protein, and patients have suffered from the monotony of a prolonged milk diet. I have drawn up two diets, the first called "Low Nitrogen Diet." This I have employed with considerable advantage in the acute stages of the disease, when patients may be hungry and find a simple milk diet unpleasant. It consists of the following:—

Low Nitrogen Diet.

Stewed fruit	-	-	-	-	8 ozs.
Bread	-	-	-	-	8 ozs.
Butter	-	-	-	-	1½ ozs.
Potatoes	-	-	-	-	8 ozs.
Green vegetables	-	-	-	-	4 ozs.
Salad	-	-	-	-	2 to 3 ozs.
Boiled rice	-	-	-	-	4 ozs.
Milk	-	-	-	-	10 ozs.
Still lemonade	-	-	-	-	3 pints.
Barley-water	-	-	-	-	1 pint.
Tea and coffee.					

The foregoing contains—

Protein, 43 grammes = 7 grammes N. (nearly).	
Carbohydrate	285 grammes.
Fat	50 grammes.
Caloric value, 1,815.	

When the acute stage was over, an "Ordinary Nitrogenous Diet" was tried, and I am definitely of opinion that this did not do any harm. Von Noorden has found that the output of nitrogen in a chronic nephritic remains satisfactory, as long as the protein intake does not exceed 94 to 96 grammes.

I therefore drew up the following diet:—

Bread	-	-	-	-	16 ozs.
Butter	-	-	-	-	2 ozs.
Mutton or fish	-	-	-	-	3 ozs.
Potatoes	-	-	-	-	6 ozs.
Green vegetables	-	-	-	-	4 ozs.
Sugar	-	-	-	-	1½ ozs.
Milk	-	-	-	-	1 pint.
Egg	-	-	-	-	One.

This contains, on an average:—

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Caloric value, 2,690.						

I may add that mutton and fish were allowed on alternate days.

(2) The second point I urged was, that stimulating diuretics are bad as long as there is any degree of acuteness, and that flushing-out of the kidney is not always advisable or practicable. Theocin is regarded as the least irritating of the stimulating diuretics, and is claimed to have the power of increasing the permeability of the kidney. It was tried in three cases. In the first, it had a decided diuretic effect, and raised the diastase content of the urine from 0 to 20. In the other two cases, it had no effect on the diastase, and only a slight diuretic action. One of these cases, also, had a return of hæmaturia when the theocin was given. Theocin, therefore, like caffeine, diuretin, and theobromin, has an irritant effect as well as a diuretic action. It is an unsuitable drug as long as there is any degree of acuteness of the disease, as, I think, are all the drugs of that class.

An instance of the failure of stimulating diuretics, and the apparent success of the saline diuretics, is seen in the following case. A patient was taking 10 grs. of diuretin and 5 m. tincture of digitalis three times a day. His average output was only 30 ozs. of urine. On replacing this by acetate of ammonia and sodium bicarbonate, the output rose to 92 ozs. On adding 5 m. tincture of digitalis to this, in order to see whether the diuretin or the digitalis was to blame, the output rose to 110 ozs. I am of opinion, therefore, that the diuretin, so far from acting as a diuretic in this case, diminished the output by irritating the kidney.

As to the impracticability of flushing out the kidney in cases of acute nephritis, the following instance is interesting: A patient with œdema and ascites was drinking 4 to 5 pints of fluid a day; his output was 2 to 2½ pints of urine daily. I then restricted him to 2 pints of fluid a day. The output then actually rose to 2¾ pints, the Esbach result remained the same, and the œdema and the ascites diminished.

There is, however, a distinct risk in diminishing the intake of fluids too much, in view of the inability of the kidney to secrete concentrated fluids. I have seen symptoms suggestive of uræmia as the œdema rapidly subsided while the intake of fluids was restricted, and I imagine that this is due to the fact that the last quantity of œdematous fluid reabsorbed into the blood stream must be relatively concentrated in toxins.

(3) Thirdly, I suggested that the hot-air bath has certain definite limitations. When it causes salt to be excreted by the skin, it does good by diminishing the osmotic pressure of the tissues, and relieves the strain on the kidneys, which cannot deal well with salt in this disease. Therefore, if the hot-air bath is doing good, it will be followed by diuresis, because it gets rid of sodium chloride, and my practice is to watch the output of urine after a bath. If this rises, the case is apparently a suitable one for this treatment. It follows that only cases in which dropsy is still present are benefited by the hot-air bath.

For hæmaturia, I have found little treatment of avail. It was noticeable that many cases went on bleeding long after the acute symptoms had subsided, as if the kidney leaked blood. I therefore tried various drugs, such as hamamelis and ergot, but only occasionally did I find these of any benefit. The best example was in a case who had had hæmaturia from May 1 to August 18. On the latter date, 20 m. of tincture of hamamelis were given three times a day. On the 21st, there was only a faint trace of blood, and on the 24th, there was none. After this date the urine kept free.

As to relieving the congestion of the kidney by dry-cupping, my experience has been unfortunate; it does not seem to have done any good, and in several cases it increased the hæmaturia. So I abandoned the method.

Venesection, on the other hand, I have often found good for cases which were not doing well, either in output of urine or because they were developing uræmic symptoms. As I have already said, I believe it to be most effective in the treatment of the convulsions occurring in this disease.

DISCUSSION.

LIEUTENANT J. SHAW DUNN, M.D., spoke of the patho-

logical work which his colleagues and himself had been carrying out in a mobile laboratory in France. The disease under discussion was seen at an earlier stage in the casualty clearing stations in France than that presented by cases in this country. It would be impossible to present an inclusive picture of it at its early stage, perhaps because different stages were viewed together. Captain Macnee and he had noticed that a group could be picked out as characteristic, which differed in certain particulars from the usually accepted picture of acute nephritis occurring at home. The patients looked healthy, there was little or no anæmia nor loss of flesh, and many of the men were seen as "walking cases." Dyspnœa was very common, though not urgent. The urinary features were peculiar, and usually there was an increased output. Measurements frequently disclosed an output of 50 to 60 ozs. per day, even in patients passing large amounts of albumen. That must mean the passage of large amounts of albumen daily, more than occurred in the ordinary case at home, which usually passed a diminished quantity of urine. Frequently 2 parts of albumen per 1,000 were found, and 4 parts per 1,000 was not an uncommon figure. In some, it rose to twice the latter figure, Esbach, so that the urine would have to be diluted to give an accurate reading. Yet mostly the urine was clear, and naked-eye appearances did not suggest blood, an unusual feature compared with the cases seen at home. There was usually a scanty sediment; casts were generally found, but were seldom numerous. The usual type was hyaline, with some adherent epithelial cells, neither a pure hyaline nor a pure epithelial cast. Blood casts were uncommon. In the cases he saw, rapid improvement was the rule, short though their stay was under his inspection. A man who was passing 6 parts of albumen per 1,000 when he came in, might, at the end of five days, be passing half a part per 1,000, while after a week there would be only a trace. In this conspicuous type of nephritis, there was usually no rise of temperature; it occurred only in the patients who passed a considerable quantity of blood.

As to causation, several facts seemed to be against the condition being regarded as a purely infective process in the same way that scarlet fever was infective. In France, military

men were much mixed up with civilians, yet, even in dense populations, the disease was almost unknown among the civil population, a statement which was based upon careful investigation by Captain Macnee. Neither did there seem to be anything to support the idea that the ground might be infected.

Dealing with the pathological condition, he had examined, with Captain Macnee, 24 cases which were diagnosed as nephritis. Rejecting three chronic cases, and a hæmorrhagic case probably due to epidemic jaundice, 17 were acute, 2 sub-acute. The kidney lesion varied somewhat in detail, but there was one essential feature common to them all. As a rule, the kidney showed little change that was recognizable by the naked eye, but, on examining the cut surface of the organ, the glomeruli were not visible as red points, but projected as somewhat translucent pale nodules, obviously bloodless. The histological changes observed affected both the tubules and the glomeruli. There was catarrh, which was indicated not so much by a visible loss of cells as by regeneration of cells, evidenced by the occurrence of karyokinesis in those of the secreting tubules. In the tubule cells in some cases there was fatty degeneration, and some degree of tubular hæmorrhage was practically always present. The main and most constant changes were in the glomeruli.

On the question of the cause of the kidney lesion, Captain Macnee's examination of the urines of a number of cases did not carry one very far. Streptococci were obtained in culture in many instances, but it was doubtful if they were pathogenic and derived from the kidneys. They were not seen in direct films of the sediments. The examination of organs in certain cases did not yield promising results as to a bacterial cause. But some pathological conditions found in the organs seemed suggestive. In the case of a man who died in hospital with well-marked nephritis, with considerable dyspnœa and œdema, certain striking facts were obvious to the naked eye. There was a difficulty in seeing the glomeruli; these were not red, but pale and translucent in appearance. The lungs were much enlarged and acutely emphysematous, each lung being as heavy as a liver, and they contained patchy diffuse hæmorrhages. The spleen was slightly enlarged, and showed numerous punctiform hæmorrhages. The white matter of the brain was

dotted over with small hæmorrhages, especially in the posterior and anterior poles. Histologically, a peculiar lesion of the lungs was found. One slide exhibited showed two terminal bronchioles with infundibula being given off from them. The walls were coated with fairly dense fibrin; the normal epithelial covering was lost. The lung lesion was one which nobody could be expected to distinguish from that caused by the inhalation of a caustic irritant gas, such as chlorine. The larger bronchi in this lung showed total loss of epithelial lining, and in many cases the epithelial layer was replaced by fibrinous exudate. Evidence had now been obtained of similar changes in all cases of nephritis where these organs were available. In six out of seven cases, in the regions of greatest damage, there was present, in the pulmonary capillaries, thrombosis in minute form. This was definitely shown under the microscope in three cases. Sometimes capillary hæmorrhages were found in the spleen. In two cases, the brains showed peculiar hæmorrhages. There was a small vessel in the centre, which contained normal blood; around the vessel was necrosed brain tissue, and the hæmorrhage was outside that. It was assumed that the condition was embolic, and several emboli had been found. The thrombi in the pulmonary capillaries might readily reach the systemic blood stream. Examination of several of the cases suggested a process of multiple capillary embolism, the emboli being deposited in various organs, but not everywhere producing lesions.

In cases of death from shell-gas poisoning, certain peculiar facts had emerged. The lung condition was pretty much that which had been described in the first case of nephritis. The main histological lesion was in the terminal bronchioles and infundibula, and in some cases was accompanied by very extensive thrombosis in the pulmonary capillaries. The kidney, in one case, contained thrombi in its glomerular capillaries, these thrombi exactly corresponding with those found in the lung capillaries. In that case, death occurred three days after the man was known to have inhaled shell-gas; in those three days, the damage had been caused, and thrombi had been carried through the circulation and into the kidneys. If the inhalation of an irritant had anything to do with the causation of nephritis, how did the poisoning come about? He had no definite suggestion on

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With regard to the "Phthalein" test, phenol-sulphone-phthalein was a bright red crystalline powder, and was excreted with great rapidity. He described the technique of the test. The permeability of the kidney for the drug was decidedly decreased in both chronic parenchymatous and chronic interstitial nephritis, and its great prognostic value lay in its indication of the degree of functional derangement present. It also showed when uræmia was impending. In most cases tested, the diastase reaction and the results of the Phthalein test were in agreement. In some cases the latter test was the more helpful of the two, because it showed impending uræmia, even in the absence of ordinary clinical symptoms. From the prognostic point of view, he recommended that both tests should be done in every case.

Mr. WALTER H. JESSOP, F.R.C.S., said he had made a study of 225 cases of trench nephritis. Of 45 cases specially investigated, 21 (or 46·6 per cent.) showed retinœdema. In some cases yellowish-white plaques could be seen, by means of the ophthalmoscope, to come and go. He expressed his objection to the term "albuminuric retinitis." Of a series of 75 cases, 70·7 per cent. had retinœdema: in some there was detachment of the retina. 56·6 per cent. of the cases were between the ages of 20 and 30 years. That these plaques should appear, and subsequently disappear, leaving no trace of having occurred, surely pointed to a true toxæmia. In very few cases were there ocular hæmorrhages, for the arteries did not seem to be affected, neither was the blood-pressure altered.



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In conclusion, he expressed his gratitude to his superior officers for their kindnesses, and to the Medical Research Committee for the facilities they afforded for the carrying on of the work.

Mr. J. E. ADLER, F.R.C.S., related his experiences at the Bermondsey Military Hospital, Ladywell, where the chief problem was what to do with these men, who looked robust and healthy. Their chief guides were urinary examinations, and tests to determine the excretory powers of the kidneys. His own view was that the final verdict should rest on the findings in the urine. The tests used were two: the diastasic test (known as the D value), and the "Phthalein" test. In addition, work had been done with the electrical resistance apparatus, known in its results as the hæmo-renal index. In trench nephritis, they found red blood-cells in the urine very frequently. The microscopic test for blood was relied upon as the most delicate. In many cases, the red cells persisted long after other abnormal findings had disappeared. Leucocytes were found in most of the cases, and they remained long after the albumen had disappeared. They were mostly polymorpho-neutrophiles. Renal cells and cells from the bladder and genito-urinary tract were often met with. Granular or hyaline casts were numerous but fatty casts were never found. The crystals which were seen on occasion were usually triple phosphates; there were also urates and oxalates. On two occasions, protozoa of the genus *Prowazekia* were found.

The diastasic test had been found of great value in prognosis. For this, a sample of the 24-hourly urine should be taken, owing to the great variation in the D value, apparently dependent on the food taken. The D value of 40 cases of trench nephritis varied between 2 and 10: 85 per cent. were between 4 and 6.6, showing, apparently,

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man in his search for the cause of death.

It is customary, for medico-legal purposes, to regard death as the result of failure in function of one of the three systems, nervous, circulatory, and respiratory, and we speak of death from coma, syncope, or asphyxia. Although two of these modes are not infrequently combined in a single case, and a fatal seizure which begins as coma or asphyxia may terminate by heart-failure, the classification serves a useful purpose by directing attention to the systems in which the disease which causes death is most frequently situated. When disease has its origin in other organs of the body, death is commonly the result of secondary involvement of one of these three systems.

It will simplify the discussion of sudden and unexpected death, if I deal first with cases which show disease of one of these three systems as the cause of death.

The Circulatory System.—One of the most frequent causes of sudden and unexpected death is disease of the coronary arteries, producing narrowing and rigidity of the vessels and malnutrition of the heart-muscle. The disease may involve both arteries equally, or it may be advanced only in the more important left artery; I have seen specimens in which the ventricular branch of that artery alone showed marked disease. As might be expected, death occurs in some of these cases during or shortly after sudden exertion. Thus, an elderly man ran for his morning train; he caught it, but fell forward in the seat of the carriage immediately after the train had left the station, gave several gasps and was dead. He had advanced disease of both coronary arteries. There had been no previous attacks of angina, as is generally the case when the disease is met with in the coroner's court.

I have been surprised to find that, out of over 50 cases of this condition, a large proportion have been in persons who have been found dead in bed, having retired at night apparently in good health. The heart of a man, who was found dead in these circumstances, showed advanced disease of both coronary arteries, especially of the ventricular branch of the left artery, a portion of which scarcely admitted a bristle.

Interference with the coronary circulation followed by

SUDDEN DEATH.*

BY BERNARD H. SPILSBURY, M.B., B.CH.

Pathologist to St. Mary's Hospital, W., etc.

To any medical man may come an urgent summons to a case of sudden and unexpected death. The person, he is told, appears to have been in good health, or if suffering from some ailment this was not regarded as serious, and does not appear to afford an explanation of the sudden fatality. There may be no suspicion that violence or poison has played a part in the death, yet the medical man is unable to certify the cause, and the probable sequel is a coroner's enquiry.

He is likely, therefore, to be called upon to ascertain the cause of death by a post-mortem examination, and he enters upon this task with, it may be, no clue as to the region of the body in which is situated the lesion which has caused death. In many cases the task proves an easy one; a cerebral hæmorrhage, or a ruptured heart explains the fatal seizure. But there are cases in which the disease is situated in a part where it may be overlooked, or in which the changes found may be so slight that they do not seem to afford an adequate explanation of the cause of the death, which, therefore, remains doubtful.

It is in such cases that a pathologist can be of service, with his greater experience of post-mortem appearances, and with a histological and bacteriological equipment to assist in the solution of difficulties, an equipment which is taking an increasingly important position in medico-legal investigations. It is in such circumstances that my assistance is invited, and I thus have frequent opportunities of investigating obscure conditions.

In a review of cases of sudden and unexpected death, collected mainly from experiences in the coroner's court, I shall lay special emphasis upon conditions, some of them very rare, which are likely to cause difficulty to a medical

* Based on a paper read before the Harveian Society of London.

in the early stage of fevers.

An example of the last of these conditions is that of a child, nine years old, who had a sudden convulsion and died; she had been sick on the previous evening, and did not appear to be well, but no serious condition was suspected. On post-mortem examination, a dilated heart and diseased heart-muscle, and a vividly-inflamed throat were found. Two other children in the same family had been sent away with scarlet fever a few days before this occurrence, and I have no doubt that this child died from the same disease.

Exophthalmic goitre occupies an important position as a disease liable to cause sudden death, owing to secondary disease of the heart-muscle. The risk attending the administration of an anæsthetic in this disease is well known, but death may occur suddenly with no apparent exciting cause. Thus, a girl known to be suffering from the disease died in a railway train about midway between South Wales and London; she had had a fainting attack several days before, but apart from this she appeared well.

In another case, a soldier, 41 years of age, who had been severely wounded and had spent many months in military hospitals undergoing a number of operations, was discharged from the Army as unfit for further service. He afterwards entered an ophthalmic hospital to have fragments of shrapnel removed from his eye, and was found dead in bed one morning. On post-mortem examination, there was a greatly dilated heart with very diseased muscle, a thymus gland was present, and the thyroid was enlarged and had the microscopical structure characteristic of Graves's disease. At no time had the disease been suspected, and it had probably developed gradually after, and I believe, in consequence of, his injuries and shock.

Chronic alcoholism may lead to sudden fatal syncope, the result of disease of the heart-muscle; this is more likely to occur from unwonted exertion or during an acute maniacal attack.

Persons who have disease of the heart-muscle are liable to die suddenly when exposed to a noxious condition which is insufficient in degree to produce ill effects in a normal

sudden death may result from disease of the first part of the aorta, frequently syphilitic aortitis, causing narrowing of the orifices of the coronary arteries, the vessels otherwise being free from disease. Sudden death may occur in a young man from this cause. I recall a case of this nature in a patient in St. Mary's Hospital. He went to the lavatory, and as he did not return, a search was made; he was found sitting on the lavatory-seat dead, with this condition of aortitis alone to account for the sudden death.

Hæmorrhage into the pericardium is a fairly common cause of unexpected death; it may be due to rupture of the heart or aorta, or to rupture of an aneurysm in the aorta or coronary artery. In the latter case, the source of the blood may be difficult to find. In a recent examination of the body of an old lady, who had fallen down a flight of steps at a railway station, I found a small tear in the aorta close to the valve. The tear extended to the outer part of the vessel wall and the escaping blood gradually forced a passage between the aorta and its pericardial covering, then through the fat on the surface of the heart, finally bursting into the pericardial cavity 2 inches from its point of issue. She had been shaken by the fall, but was able to return home alone. She collapsed suddenly, and died about an hour after the accident, the process of dissection having occupied that time.

In cases of hæmorrhage into the other body cavities, due to ruptured aneurysms, tubal gestations, rupture of tuberculous cavities caused by hæmorrhage into them, and many other conditions, the cause is generally revealed by a post-mortem examination.

Cases of sudden death due to disease of the heart-muscle, uncomplicated by diseased coronary artery, occur frequently in old persons with senile disease of the muscle, and in those who have unsuspected or chronic disease of other organs with secondary degeneration of the heart-muscle. Such conditions are lobar pneumonia, chronic Bright's disease, puerperal eclampsia, to mention only a few. In the same group may be placed the sudden deaths occurring after diphtheria and influenza, and the occasional sudden deaths

Air obtained entrance through the latter vessel. The act was performed late at night in a quiet street, splashes of blood showing where it had been committed. He then appears to have repented, and attempted to arrest the bleeding with his handkerchief, at the same time walking up a steep hill, his course being shown by drops of blood upon the pavement. Near the top of the hill he evidently became weak, for his course was less regular, but he reached the top and turned the corner; he was found a few yards further, lying on his back in a pool of blood, with a blood-soaked handkerchief in one hand. He was dead, and the cause of death was air-embolism. Weakness had evidently caused him to withdraw the handkerchief from the wound, and air had entered. He had covered a distance of almost 200 yards.

Congenital heart disease is a common cause of sudden and unexpected death. I have investigated many cases of suspected death from overlaying in infants, ranging in age from a few days to several months. In a large proportion of the cases, there was no indication of pressure over the mouth and nostrils, but I found a pronounced degree of congenital defect of the heart, associated with the appearances of death from asphyxia—surface lividity, dilated pupils, congested conjunctivæ, dark fluid blood, petechiæ in the surfaces of the heart, lungs, and thymus, and hæmorrhages in the scalp and meninges of the brain.

These cases are deaths from congenital heart disease, due to imperfect aeration of the blood and not to the infant having been overlaid by one of its parents. That these deaths occur more frequently when a child is in bed with its parents, may, perhaps, be explained by a reduction in the amount of fresh air reaching the child in such conditions, with a lowering of its oxygen content, which is slight but sufficient to turn the scale against a child handicapped by a defective circulation. A widely patent ductus arteriosus is the commonest defect, a patent foramen ovale is fairly common; in one case, the defect was in the inter-ventricular septum, a cleft-like communication between the ventricles being found. A careful examination of the heart and blood vessels is necessary to discover these defects; they are probably often overlooked, and the statistics of death from overlaying are, in consequence,

individual. Many of the sudden deaths from exposure to cold, and some which follow exposure to heat, occur in those who have weak heart walls; the passage of a weak electric current or emotional shock may cause sudden death in such persons.

Valvular disease of the heart, especially of the aortic valve, is one of the best known examples of a disease liable to a sudden fatal termination; in many of these cases, however, the sudden death is not unexpected, and this disease appears in the coroner's court less frequently than other rarer conditions.

Pulmonary embolism, reducing or completely arresting the pulmonary circulation, is an occasional cause of sudden unexpected death. It may occur after a normal confinement or following an appendix operation, and happens generally during convalescence, when the patient begins to move about. Dislodgement of a thrombus may cause death during an operation. In these cases, careful examination of the contents of the pulmonary artery and its branches reveals the presence of firm clots, which do not conform in size or shape to the vessels in which they lie, and which are often heaped up in the branches or lie across the bifurcation of the main artery; occasionally, they can be traced to the site of origin.

A similar cause of sudden death is embolism of the pulmonary artery by air, which is sucked in through a wound in a vein, and becomes churned up into a bloody froth, distending the pulmonary artery and producing a complete block in the pulmonary circulation. Most of these cases occur during operations upon the neck, though wounds of veins in other parts of the body may produce the same result, thus, sudden death from air-embolism followed a wound of the lateral sinus during an operation for middle ear disease in a child.

Air-embolism sometimes causes death in cases of cut-throat. In the case of a man who cut his throat with a penknife, there were two cuts, one emerging from the centre of the other. The only blood-vessels of importance which had been injured were the external jugular vein, completely divided with its ends retracted beneath the skin, and the common facial vein completely divided half-an-inch from its junction with the internal jugular.

tion of carbon dioxide, collapsed and died before he could be removed.

It has been stated that an enlarged thymus gland may cause death from asphyxia. I have never found signs of death from asphyxia in fatal cases associated with ordinary enlargement of the thymus, but only in cases in which there has been a tumour of the gland. A lymphosarcoma of the thymus, removed from a child of 2 years and 3 months, was three times the size of a very large hypertrophied thymus, and caused sudden death from asphyxial convulsions, after several similar attacks during the last 48 hours of its life; prior to that time the child appeared healthy.

In an adult, a much larger tumour may develop in the mediastinum, before pressure upon the air-passages causes death from asphyxia; occasionally, sudden death occurs in such cases. I have seen a lymphosarcoma of the mediastinum, a compact mass of growth almost $\frac{3}{4}$ lb. in weight, which was removed from a young man, aged 19, who was found dead in bed. He had complained of a recent cough, but was a strong, healthy individual.

A rare case of death from asphyxia was that of a young man, who suddenly became cyanosed during the extraction of teeth, and died in about 20 minutes. He had advanced tuberculous disease of the cervical vertebræ, and a mass of tuberculous granulations formed a lining to the spinal canal. Bending of the diseased bones during the operation caused pressure upon the spinal cord deranging the nervous mechanism of respiration.

Hydrocyanic acid, one of the most rapidly fatal poisons, probably acts by paralysing the respiratory centre, and in acute cocaine poisoning the action may be similar. Injection of a strong solution of cocaine into the urethra of a man who had a false passage, caused sudden convulsions, followed by coma, and death within five minutes of the onset of the symptoms.

The Nervous System.—There are many diseases of this system which may cause sudden and unexpected death. Cerebral hæmorrhage is one of the most frequent of these, but it is seldom that death from this cause is so rapid as in a case narrated to me by a medical man. He received an urgent summons to an old lady, and found her sitting in a bath

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The Respiratory System.—Asphyxia is less frequently a cause of sudden death than syncope. One of the commoner causes of death from asphyxia is vomiting during periods of unconsciousness and regurgitation of the vomit into the air passages; it occurs sometimes under anæsthesia in cases of acute intestinal obstruction as well as in unconsciousness due to other causes, such as cerebral hæmorrhage or narcotic poison. One case occurred in a man who was arrested for being drunk and incapable, who died from this condition in a police cell.

The pressure of a goitre or a rapidly-developing œdema of the larynx may lead to sudden asphyxia. I once obtained a specimen of angio-neurotic œdema of the larynx taken from a man who had several attacks, and who died suddenly one night in bed before a doctor could be fetched. The ary-epiglottidean folds were greatly swollen, and completely covered the inlet of the larynx.

Acute poisoning by carbon monoxide leads to death from asphyxia. Apart from the characteristic changes in the blood, the circumstances of these deaths generally point to the cause, an escape of coal-gas. I have seen cases however, in which the breathing of the waste gases from a motor engine, running in a confined space, has caused death from carbon monoxide poisoning.

Deaths due to outbreaks of fire in houses are often the result of poisoning by carbon monoxide produced by incomplete combustion.

An infant, of 13 months, was taken from a room in which some of the furniture was on fire. The child had not been burnt or exposed to a very high temperature, but on examination it was dead; the blood was found to be half saturated with carbon monoxide.

Deaths from carbon dioxide poisoning are very rapid, and the changes produced are slight, the only evidence of the mode of death being lividity and a dark fluid condition of the blood. Apart from explosions in mines, the cases are rare, and the circumstances of the death generally point to the cause. Thus, a man who entered a large brewer's vat, immediately after the fermenting liquor had been run off and whilst the air contained a large propor-

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one of the ventricles. These are only a few of many conditions of disease in the central nervous system in which sudden death may occur.

The most difficult cases are those in which death is the result of shock, uncomplicated by any recognizable morbid condition. There are certain regions of the body, in which manipulation or injury, so slight as to leave little or no indication at a post-mortem examination, occasionally causes sudden death. The regions with which this danger is associated are the genital organs, the upper part of the abdomen, as a result of pressure or a blow in the epigastrium, the throat, and the nose, and some of the cases of sudden death resulting from immersion in cold water may perhaps be placed in the same group. The difficulty lies in the absence of morbid conditions at post-mortem examination, the body appearing to be that of a normal person, or in the presence of changes which may seem quite inadequate to account for death, much less sudden death.

It is only when the circumstances attending the death are known, or can be deduced, that an opinion can be given that death resulted from shock due to manipulation of one of these regions of the body; in the absence of such knowledge, it may be impossible to give an opinion as to the cause of death. Needless to say, all possible morbid conditions must be excluded by a most careful and thorough examination of the body before an opinion is given that death is due to shock.

The occasionally fatal knock-out blow in boxing is the most familiar example of sudden death resulting from a blow in the epigastrium. In the following case such a blow was the probable explanation of a sudden death. A man coming home intoxicated, was left in the house alone for about half-an-hour. He was then found dead at the foot of a flight of stairs. At autopsy, he was a generally healthy man; there was slight bruising around the head of the pancreas, and another small bruise in the mesentery of the small intestine. The stomach was full of food and fluid, having an odour of beer. I had an opportunity of examining the premises, and I found a recently broken tread on one of the stairs, from which he could have pitched on to a bannister post at the bottom of the flight, falling from the post down another short flight at

half-filled with water. The upper part of the body was dry, and one hand holding a sponge was raised halfway to her face; she was dead, and rigor mortis was present. On examination, he found a large cerebral hæmorrhage which had caused sudden death with instantaneous rigor mortis.

Latent meningitis, so-called, either acute or tuberculous may cause sudden death with little or no preceding illness.

A child, aged two years, who had been drowsy for some time, suddenly developed twitching of the face, followed by convulsions and coma, and died within half an hour. On the same day, an older sister complained of headache and pain in the neck, and died with similar symptoms on the following day. These were cases of acute cerebro-spinal meningitis. In rapidly fatal cases, only intense congestion of the cerebro-spinal meninges may be found, though the fluid at the lower end of the spinal canal is often turbid. Bacteriological examination is required to establish the cause of death in these cases.

I have found chronic internal hydrocephalus as a cause of sudden death on several occasions. In some of these cases there has been a history of attacks of giddiness or of headaches, but in others there was no suspicion of ill-health. In one case, an ependymal cyst was found in the third ventricle of the brain, attached close to the iter which it covered, the result being the development of internal hydrocephalus. I found it in a young man who had had attacks of headache for several months, then very severe headache for some hours, terminating in sudden death. In some of these cases, post-mortem imbibition of the cerebro-spinal fluid by the brain tissue may leave the ventricles empty, and there will be found only decided dilatation of the ventricles, flattening of the cerebral convolutions, and some roughening of the inner aspect of the skull as evidence of an increase of intra-cranial pressure.

Cerebral tumours are liable to give rise to very puzzling symptoms, and may cause sudden death with few or no preceding symptoms. Death is sometimes the result of hæmorrhage into a tumour, the cause of the hæmorrhage being easily overlooked in such cases, or may be due to detachment of a tumour and its movement in the brain, or, in the case of a cystic tumour, to rupture of a cyst into

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blood-stained and lay between her legs. On post-mortem examination, she was a healthy woman about $2\frac{1}{2}$ months pregnant. The neck of the uterus was slightly dilated, and there were several small lacerations around the external os. The uterus contained a complete ovum with the membranes unruptured, but separated from the wall for some distance upon the posterior surface, the space being occupied by about $1\frac{1}{2}$ ozs. of soap solution. No serious injury had been inflicted, and she had died suddenly from the shock of injection of fluid into the uterus for the purpose of procuring abortion. The evidence failed to show that any other person had assisted her in the commission of the act.

I have investigated two other cases like this in every respect, save only that death resulted in each case from slight dilatation of the external os uteri, and no fluid had been injected into the uterus; in two further cases, similar manipulation of the uterus by other persons, with the same object, had caused sudden death. In such cases, death must be the result of afferent nervous impulses, passing from the area of manipulation to the central nervous system, reinforced, it may be, by an abnormal mental excitement, so that a procedure which is being constantly employed without ill effects, occasionally leads to sudden death.

Examination of the body rarely affords any indication as to the mechanism whereby the afferent impulses to the central nervous system lead to the fatal result. In some cases, I suspect that a vaso-dilatation in the splanchnic area or more generally, with rapid fall of blood-pressure, may be the explanation; or it may be that the shock causes sudden and simultaneous arrest of both cardiac and respiratory functions, a process to which the term inhibition was given by Brown-Séquard.

Finally there are the cases of sudden death occurring in those who are under the influence of an anæsthetic. I have divided the cases into two groups, those in which the condition known as "status lymphaticus" or lymphatism has been found, and those in which it is absent. An analysis of 182 deaths occurring under anæsthetics gives 48 cases, about 26 per cent., in the first of these groups.

In one case, a man aged 21 years, the persistent thymus weighed about $\frac{1}{2}$ oz., and the enlarged spleen, $13\frac{1}{2}$ ozs., showed

the bottom of which he was found. I formed the opinion that death was the result of a blow in the epigastrium, probably caused by a fall on to the bannister post.

Another case was that of an elderly lady travelling by train with her husband. She went to the lavatory, and as she did not return, her husband, about half-an-hour later, made a search for her. He found the lavatory door unfastened, but could open it only 2 or 3 inches. The train was stopped at the next station, the lavatory window was broken and access thus obtained; she was found in a kneeling posture on the floor against the door. She was dead, and on the floor, by her side, was a piece of paper with the following words in her writing "I have burst a blood-vessel in my brain." That condition, I need not say, was not found at autopsy, but there was some hæmorrhage into the outer or serous coat of the stomach in the lesser curvature and around the adjacent part of the head of the pancreas. A diseased artery, found close to the hæmorrhagic area, pointed to rupture of such a diseased vessel caused probably whilst straining at stool. The pressure of the effused blood led to symptoms, the onset of which was so slow as to enable her to realize that something was the matter, and to write those words and unfasten the door before unconsciousness supervened. It would have been interesting to know what those symptoms were, but from the slow onset I suspect that death was the result of a reflex vaso-dilatation, consequent upon irritation of the vagus in the stomach wall, with resulting cerebral anæmia, and that a blow in the epigastrium may produce the same result, only with greater rapidity.

Cases of sudden death from shock due to manipulation of the female genital organs are very rare, but I have seen several cases in which an attempt to induce abortion has led to death from this cause.

One case was that of a young married woman, who had one child. She was left alone in her house one evening for about $1\frac{1}{2}$ hours. Her husband on his return found her in her night attire, lying on her back on the bedroom floor, dead. On a sheet spread out on the floor beneath her was an enema syringe, one end of which was in a pudding basin half filled with a concentrated warm soap solution, which set solid on cooling. Similar soap solution was found in the bulb of the syringe. The other end of the syringe was

blood-stained and lay between her legs. On post-mortem examination, she was a healthy woman about $2\frac{1}{2}$ months pregnant. The neck of the uterus was slightly dilated, and there were several small lacerations around the external os. The uterus contained a complete ovum with the membranes unruptured, but separated from the wall for some distance upon the posterior surface, the space being occupied by about $1\frac{1}{2}$ ozs. of soap solution. No serious injury had been inflicted, and she had died suddenly from the shock of injection of fluid into the uterus for the purpose of procuring abortion. The evidence failed to show that any other person had assisted her in the commission of the act.

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overgrowth of the lymphoid tissue. Death occurred suddenly during extraction of teeth, whilst under the influence of chloroform. These two organs are examples of the most striking changes seen in status lymphaticus, other changes which are constantly found comprising lymphoid hyperplasia along the alimentary canal—the back of the tongue, tonsils, pharynx, the wall of the stomach, the lower part of the small intestine, the mesenteric glands, and the large intestine. Such a wide distribution of overgrown lymphoid tissue is not seen in every case, the older subjects especially showing the changes in more limited areas. Associated with these changes, I have always found a degeneration of the heart-muscle, generally fatty degeneration.

Status lymphaticus is met with occasionally in sudden deaths from shocks of various kinds, and it is described with the anæsthetic deaths only because of its greater frequency in those conditions. The anæsthetic deaths in which status lymphaticus is found, occur in a large proportion of the cases during the operative treatment of comparatively slight conditions, such as circumcision, operations upon the nasal septum, for the radical cure of hernia, or for the removal of enlarged tonsils and adenoids, to mention only a few; it is only exceptionally that a patient, in whom the condition is found after death under an anæsthetic, is seriously ill. The age period of status lymphaticus deaths ranges from 18 months to 48 years, but one-half of the cases occur before the 15th year, and most of the remaining cases are in the third decade.

The morbid conditions found in anæsthetic deaths belonging to the second group are very various. In many, the condition is a serious one, malignant growths figuring prominently in the list, and in some the patients were so desperately ill that the anæsthetic can have played only a minor part in accelerating death. In a few of the cases, the anæsthetic took no part in death, which was caused by such conditions as profuse hæmorrhage, pulmonary or air embolism, or operation for decompression in a brain tumour. Disease of the heart-muscle was found in these cases also, the only case which showed none occurring in a child to whom liquid chloroform was given by mistake, a Junker's inhaler having been wrongly fitted together.

On investigation of the anæsthetics employed in the 182

deaths, chloroform, either pure or in mixture, was the anæsthetic employed in 126 cases, ether in 30 cases; the remaining cases occurring with other general anæsthetics or with local anæsthetics. The preponderance of chloroform deaths is even greater when the status lymphaticus cases are analysed, 38 out of the 48 fatalities occurring with this anæsthetic.

These figures would seem to point to the much greater toxic effect of chloroform than of the other general anæsthetics in common use. Further, the last four years have shown a notable decrease in the number of deaths under anæsthetics, and especially of those associated with status lymphaticus, and this period has seen a greatly extended employment of open ether replacing chloroform.

No attempt has been made to give a complete account of the causes of sudden and unexpected death. Cases have been selected, which illustrate some of the difficulties confronting a medical man during an examination into the cause of death, and I hope that these cases may help to explain some of the puzzles which occasionally present themselves.

overgrowth of the lymphoid tissue. Death occurred suddenly during extraction of teeth, whilst under the influence of chloroform. These two organs are examples of the most striking changes seen in status lymphaticus, other changes which are constantly found comprising lymphoid hyperplasia along the alimentary canal—the back of the tongue, tonsils, pharynx, the wall of the stomach, the lower part of the small intestine, the mesenteric glands, and the large intestine. Such a wide distribution of overgrown lymphoid tissue is not seen in every case, the older subjects especially showing the changes in more limited areas. Associated with these changes, I have always found a degeneration of the heart-muscle, generally fatty degeneration.

Status lymphaticus is met with occasionally in sudden deaths from shocks of various kinds, and it is described with the anæsthetic deaths only because of its greater frequency in those conditions. The anæsthetic deaths in which status lymphaticus is found, occur in a large proportion of the cases during the operative treatment of comparatively slight conditions, such as circumcision, operations upon the nasal septum, for the radical cure of hernia, or for the removal of enlarged tonsils and adenoids, to mention only a few; it is only exceptionally that a patient, in whom the condition is found after death under an anæsthetic, is seriously ill. The age period of status lymphaticus deaths ranges from 18 months to 48 years, but one-half of the cases occur before the 15th year, and most of the remaining cases are in the third decade.

The morbid conditions found in anæsthetic deaths belonging to the second group are very various. In many, the condition is a serious one, malignant growths figuring prominently in the list, and in some the patients were so desperately ill that the anæsthetic can have played only a minor part in accelerating death. In a few of the cases, the anæsthetic took no part in death, which was caused by such conditions as profuse hæmorrhage, pulmonary or air embolism, or operation for decompression in a brain tumour. Disease of the heart-muscle was found in these cases also, the only case which showed none occurring in a child to whom liquid chloroform was given by mistake, a Junker's inhaler having been wrongly fitted together.

On investigation of the anæsthetics employed in the 182

and, when de-mobilization does eventually take place, eczematoid ringworm will doubtless prove to be an extremely common form of dermatitis in this country, and one with which the medical profession should become cognisant so that the cases may be early recognized and effectively treated, and the spread of the disease limited.

The epidermo-phyton inguinale has a predilection for moist, warm, intertriginous parts of the body, and may attack not only the groin and extremities but the axillæ, occasionally the umbilical fold, and beneath the breasts in stout women, while in a certain number of cases all these different regions may be involved. The most common regions to be attacked in their order of frequency are the groin, axillæ, feet, and last the hands. In a considerable number of cases, the lesions on the groin are cured first, while those on the feet and hands may persist long afterwards, so that in ringworm of the extremities there is frequently a history of ringworm of the crutch having been present some time previously. In a case, which obtrudes itself upon my memory, a patient with ringworm of the feet gave a history of having had Dhobie itch in India some 20 years previously, and his feet, he said, had troubled him off and on ever since. He had been told that he was suffering from gouty eczema of the feet and had undergone all manner of treatment, local, dietetic, medicinal, and balneological, but without success.

MYCOLOGY.

The epidermo-phyton inguinale (Sabouraud), which is the common cause of this type of ringworm, is peculiar in that, however widely it may spread over the skin, it never attacks the hairs. It is not easily cultivated and grows slowly. On Sabouraud's proof-agar medium it takes about a week to develop, and appears first as a small, greyish-yellow, powdery culture which gradually assumes an acuminate shape. A few weeks later whitish downy tufts appear, which eventually overgrow the culture.

A variety of the epidermo-phyton inguinale was isolated by Castellani from a foot case; this gave pinkish cultures, and was named in consequence, *E. rubrum*. It was probably the same fungus which was named by Bang, *E. purpureum*.

In rare instances, other ringworm fungi have been isolated

RECENT WORK IN DERMATOLOGY— ECZEMATOID RINGWORM OF THE HANDS, FEET, AND GROIN.

By J. M. H. MACLEOD, M.D., F.R.C.P.

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Skin Diseases, London School of Tropical Medicine, etc.*

THE type of ringworm to which I wish to refer here is not the familiar ringed type, which is so common in children, but the eczematoid ringworm of the extremities, and the ringworm of the inguino-crural regions, known as *tinea cruris*, *eczema marginatum*, and, in India—where it is particularly rife—as *Dhobie itch*.

The fungus which is responsible for the majority of cases of eczematoid ringworm of the feet and hands is the *epidermophyton inguinale* of Sabouraud—the fungus which causes *tinea cruris*. A considerable number of cases of this type of ringworm have been reported during the last few years by Hartzell,¹ Lane,² and others, and in June, 1916, Ormsby and Mitchell,³ contributed an interesting paper to the American Medical Association on "Ringworm on Hands and Feet," to which is appended an analysis of 65 cases.

My reason for referring to this subject is not that any decided advance has been made in our knowledge of the mycology, symptoms, or treatment of this form of ringworm since the classical work of Whitfield and Sabouraud on the subject, but because the affection is becoming more commonly recognized, and it has been shown that many of the chronic cases of vesicular and scaly dermatitis of the hands and feet which in the past would have been diagnosed as cases of dysidrosis or scaly eczema are in reality due to ringworm fungus. This increase in the number of cases has been specially noticeable during this war, especially among the soldiers who have been through the Gallipoli campaign or have been serving elsewhere in the south-eastern theatre of the war,

¹ Hartzell: *Am. Jour. Med. Sc.*, 1915, CXLIX., 96.

² Lane: *Boston Med. and Surg. Jour.*, 1916, CLXXIV., 271.

³ Ormsby and Mitchell: *Jour. Am. Med. Ass.*, 1916, LXVII., 711.

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in cases of eczematoid ringworm of the hand, such as the ordinary ringworm fungi, the *trichophyton acuminatum*, *T. violaceum*, etc. In those cases, the hand affection occurred quite independently of *tinea cruris*, and was an accidental involvement.

DEMONSTRATION OF THE FUNGUS.

The diagnosis rests with the demonstration of the fungus. For this purpose, a scale is detached by forceps or a blunt scalpel, placed with the deep side uppermost on a microscope slide and covered with a drop of liquor potassæ, a cover slip is applied, and the specimen gently heated and allowed to stand for a quarter-of-an-hour, then examined with the high power. If positive the fungus can be seen as branching mycelial threads and chains of spores ramifying among the horn cells. It may be necessary to make a number of specimens before a positive one is obtained.

PATHOGENESIS.

The epidermo-phyton inguinale on reaching the cutaneous surface proliferates, and its mycelial threads gradually insinuate themselves between the cells of the horny layer of the epidermis, where they eliminate a ferment which has a solvent action on the keratin of the cells, causing their dissolution, and at the same time exerting a toxic effect which results in a definite inflammatory reaction in the upper part of the corium. This reaction, if mild, consists simply of a dilatation of the blood-vessels of the papillary and sub-papillary layers with an extravasation of serum and a cellular deposit of lymphocytes and possibly of a few polynuclear leucocytes. Where the toxins produced by the fungus are more virulent, however, the serous exudation may be so profuse as to lead to the formation of vesicles which rapidly become transformed into pustules.

Although the lesions in the feet, hands, groin, etc., are due to the same fungus and have the same essential characteristics they are so modified by secondary considerations, such as their situation and the degree of heat and moisture of the parts involved, that it will be advisable for the sake of clarity to

describe the eczematoid ringworm of the hands and feet separately from that of the groin and axillæ.

ECZEMATOID RINGWORM OF THE EXTREMITIES.

The clinical appearances presented by eczematoid ringworm of the hands and feet vary considerably in different cases. The essential lesion is a pinhead-sized, deeply seated vesicle, which has been compared to a sago grain embedded in the epidermis. A varying number of these vesicles make their appearance, sometimes grouped, at other times irregularly and widely distributed. They are situated on healthy skin and not surrounded by an inflammatory halo unless when they become contaminated with pyogenetic cocci and purulent. In a few days the vesicle dries up and the roof comes away as a scale, leaving a denuded, shiny, sometimes moist surface surrounded by a free or upturned scaly edge. Occasionally the vesicles coalesce to form blebs which may reach the size of a sixpence or larger, and these in turn give rise to irregular areas of considerable extent. About the soles of the feet the fungus may produce coarse scales and horny thickenings, or between the toes may give rise to a thickened white sodden skin somewhat like parchment.

Three main clinical types of eczematoid ringworm of the extremities may be described, but these merge into one another and all varieties of lesions may occur in one case.

1. An acute vesico-bullous type which tends to attack chiefly the interdigital clefts, spreading from there on to the dorsum of the foot or back of the hand in the form of erythematous patches, with a more or less definite border which may be scaly or dotted over with small vesicles or vesico-pustules.

2. A chronic variety which may succeed the acute type, with indefinite scaly patches, the scales of which tend to be loose at the margin and to fall off leaving a raw glazed surface.

3. A thick scaly variety affecting the soles of the feet and, more rarely, the palms of the hands, in which the horny layer is thickened in patches and sometimes fissured. The edges of the patches are irregular and often detached, and beyond them may sometimes be present an erythematous

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areola and small vesico-pustules. Between the toes the horny thickening appears as white, moist, and sodden skin, and the fissures are chiefly marked in the folds of the toes. The interdigital space most frequently affected is the fourth, owing to the fourth and fifth toes being kept more closely in apposition to one another than the others, and so forming a suitable place for incubating the fungus.

In some cases, all four extremities may be involved, while in others it may be confined to the hands or the feet, and not infrequently to only one member.

In association with the skin lesions the nails are liable to be implicated and to become, in consequence, discoloured, thickened, and brittle, and sometimes raised and turned up at the free border, owing to a scaly accumulation on the underlying nail-bed.

The affection is more common in the feet than in the hands, doubtless because the feet are less frequently and thoroughly washed, and because the interdigital clefts being closed up by the boots are more likely to harbour the fungus, and, if warm and moist, to stimulate its growth.

The subjective symptoms vary according to the acuteness of the condition. In the vesicular type, there may be more or less itching and when fissures are present in the folds of the toes, they may be so painful as to interfere with walking. This type of ringworm is always aggravated by heat, either from hot weather or from the exercise of walking or running.

Diagnosis.—In the hands the acute variety has to be distinguished chiefly from dysidrosis, and the squamous type from scaly eczema, while on the soles of the feet the horny desquamating type may be confused with a scaly tertiary syphilide. Apart from the clinical differences which may help to distinguish it from those conditions, the final diagnosis can only be made good by the demonstration of the fungus.

Treatment.—The condition shows no tendency to heal spontaneously, though, as stated above, it may die down and lie dormant during cold weather. When the affection is acute or purulent, the inflammation should first be reduced by the continuous application of boric compresses, followed by the use of a dusting powder consisting of salicylic acid, one part,

boric acid, four parts, and zinc oxide, four parts. Later, a curative ointment should be applied twice daily, such as oxidized pyrogallol, 15 grains, glycerine of starch, 2 drachms, soft paraffin to the ounce. This ointment is effective, but dirty, and instead of it an ointment such as that suggested by Whitfield—containing benzoic acid 5 per cent, salicylic acid 3 per cent., in soft paraffin and cocoanut oil—gives excellent results.

The most intractable type of all, is the scaly and interdigital variety in the feet, with the white thickened skin between the toes. In it, the affected parts should be rubbed with soft soap and warm water, previous to the application of the salicylic-benzoic ointment. In some cases, even this may be insufficient, and it may be necessary to resort to such strong measures as the application to the whitened skin of a saturated solution of salicylic acid in spirit, or of salicylic plaster between the toes.

The socks should be made of white or natural coloured wool and changed twice daily, the above powder being dusted freely into them before they are put on. After being worn they should be thoroughly washed or, preferably, stoved. The boots should also be dusted inside with the powder, and should be swabbed out occasionally with a 1 in 20 solution of lysol so as to destroy any fungus which may be harboured in the moist leather, as it is possible for it to persist there, and to work its way through the sock and re-infect the feet.

RINGWORM OF THE GENITO-CRURAL REGION.

Ringworm of the genito-crural region is particularly common in warm climates, such as India, Burmah, and China, and is usually due to the epidermo-phyton inguinale. It was most probably introduced into this country by people coming from the East, and became much more common here after the return of the soldiers from the South African War. The increase of cases has been still more noticeable during the present war.

Clinical Characteristics.—It begins as slightly raised, rounded, elevated papules situated about the fork, which, owing to the moisture of the part, instead of being scaly are liable to present a raw, sodden appearance. These papules spread peripherally, the border becoming raised and well-

defined, and tend to coalesce to form irregular patches with a festooned edge which is sometimes covered with thick scales, or at other times dotted over with oozing papules or vesicopustules. Not infrequently, the affected skin becomes broken at the folds, and painful fissures result. Occasionally, the patches clear up in the centre to form circinate lesions, or a sub-acute type may be met with, in which there are red scaly areas with a well-defined, slightly raised, margin.

The affection may be limited to the inner surfaces of the thighs and folds of the groins, or it may attack the genitalia, and, in extensive cases, may involve practically the whole of the bathing-drawers area. Though it may encroach on the pubic region, the hairs are never affected. It is not infrequently present also in the axillæ, in the umbilical folds, or beneath the breasts in women, where it presents the same clinical appearances as in the groins. In the warmth and moisture of these regions the fungus grows rapidly and gives rise to considerable irritation, this is further aggravated by the friction of the clothes, and so sore may the affected areas become that the patient may be forced to lie up. The itching leads to scratching, and the lesions are apt, in consequence, to become eczematized or inoculated with pus cocci, and the ringworm to be complicated by septic dermatitis or boils. The irritation is naturally worse in hot weather, and when the patient is warm in bed or from exercise. The affection has a tendency to improve in the cold season, and may disappear or dry up to form scaly negligible patches, but it usually reasserts itself with the return of warm weather.

The exact manner in which it is contracted is, as a rule, uncertain. The fungus may be transmitted directly from one individual to another by contact, as in the case under my care, in which a wife was infected by her husband. It may also spread indirectly from the wearing of infected clothes, the use of infected watercloset seats, etc. It has even been suggested that it may pass through the clothes to the skin. It is possible that, in some cases, the strong belief in India that the Dhobie or washerman is responsible for its spread, may not be ill-founded. The native custom of washing clothes in pools of stagnant water, in which they may be mixed up with infected clothes, suggests

an explanation, but the final proof of this is incomplete for, as far as I am aware, the fungus has never been demonstrated in clothes returned from the wash. The objectionable habit of wearing trousers next to the skin is a likely way of keeping up the infection, for they are not so frequently cleaned as underclothing.

It is much more common in men than in women, and in institutions of which both men and women were inmates it has been known to attack the men alone. This is difficult to explain, for, if it were often caused by contaminated water-closet seats, it ought to be as common—in this country at all events—in men as in women. Of course, it is probable that a considerable number of cases do occur in women, which do not come under medical observation.

Diagnosis.—The diagnosis does not present any great difficulty when the lesions are well-marked and have the characteristic abrupt festooned edge, but when they are less well defined and have become eczematized or septic considerable difficulty may arise.

It has to be distinguished from the reddish patches of simple intertrigo—the result of chafing and the growth in the skin of a slightly virulent streptococcus—but in this condition the lesions are not definitely raised, are less well demarcated and are not so scaly.

Erythrasma has been confused with it, a condition due to a minute hyphomyces, in which, however, the only symptoms are a brownish discolouration of the skin covered by fine scales.

Eczema of these parts may resemble it, but the patches of eczema are more diffuse, tend to weep, and are apt to be associated with œdema and thickening of the neighbouring parts where the subcutaneous tissue is loose, such as the scrotum.

As in the case of eczematoid ringworm of the feet, the final diagnosis rests with the demonstration of the fungus.

Treatment.—This type of ringworm, as a general rule, is difficult to cure and active remedies are necessary to stamp it out. The affected region, should, in the first instance, be scrubbed with warm water and soft soap to remove the crusts, scales, and discharges; in mild cases, this should be followed by the application of a 5 per cent. pyrogallic or a

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THE USES OF SOME ELECTRICAL METHODS IN WAR-INJURIES.

By EDWIN L. ASH, M.D.

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Physician to the Italian Hospital, London.*

It is inevitable that, from now onwards, private medical practitioners will have to deal with an increasing number of troublesome lesions primarily due to war-injuries. In spite of every effort made to remedy these by the various military institutions, it is certain that there will remain a lengthy list of sufferers from stiff muscles, stiff joints, damaged nerve-trunks, and cicatricial formations of all kinds, occasioning persistent — but not irremediable — pain and disability; but, fortunately, it has been found by those working in convalescent hospitals and command depôts that electrical methods of a comparatively simple kind are capable of bringing great and widespread relief to the class of patients under notice. Under the circumstances, therefore, it is most desirable that medical men in private practice should, as far as possible, keep in touch with the electro-therapeutic methods now being carried out on an increasingly large scale in the treatment of war-injuries, so that they may be able with confidence to advise and treat men, who eventually reach them through the medium of private practice; for if adequate facilities for their scientific electrical assistance are not provided ultimately by private doctors and the out-patients' departments of the hospitals, many victims of war-injuries will be driven to seek relief at the hands of unqualified exponents of electrical treatment.

Without attempting to deal exhaustively with this important subject, I should like to draw attention particularly to the following special applications of certain methods.

I. IONIZATION.

One of the commonest types of disability due to the

3 per cent. salicylic and benzoic ointment. This treatment should be carried out at night, and in the morning the grease should be wiped away, when a 10 per cent. solution of tincture of iodine in spirit is applied, or the skin is dusted with a salicylic and zinc dusting powder.

During the treatment, small cotton bathing pants should be worn, which should be changed frequently and sterilized by stoving. In more resistant cases, the time-honoured Velmincj's solution of sulphuret of calcium¹ may be employed, and should be painted on every night for a week; this will generally be followed by recovery. It is in such cases that chrysarobin has been found to be of great value. It is best applied in the form of a 2 to 6 per cent. ointment rubbed in, twice daily, till the skin around the affected patch reacts and becomes red and inflamed; the rubbing is then stopped, for the reaction generally indicates that a cure has been effected. It is necessary in employing chrysarobin to warn the patient that the drug stains the clothing, and that, as it is a powerful irritant, it must not be allowed to reach sensitive parts, like the eyes or the vulva.

Where fissures are present, they may be healed by painting with Friar's Balsam, or with a 2 per cent. solution of nitrate of silver and spirit. For at least a month after the active treatment has been discontinued, and the lesions have apparently healed, the part should be painted over several times a week with a 10 per cent. solution of tincture of iodine in spirit to prevent recrudescence, and on alternate days dusted with a salicylic and starch powder.

¹ 1 oz. of quicklime, 2 ozs. of precipitated sulphur, and 15 ozs. of water, are boiled together in an earthenware vessel, then reduced to 10 ozs., and the clear sherry-coloured fluid is decanted after subsidence.

potassium iodide for patients in whom this additional factor appears to be playing an important part in retarding recovery.

Another very great use of ionization is in the softening of very hard and extensive cicatricial scars. In this instance, sodium chloride is highly advantageous, the ionizing solution being applied on pads connected to the negative pole. Care must be taken, in using these methods, not to reopen scars that have recently been healed up, for the softening process will be most definite at the thinnest part of the scar.

2. STATIC ELECTRICITY.

The chief use of static electricity in the treatment of the wounded is, I think, in connection with shell-shock, and for this condition I cannot speak too highly of the static apparatus as an aid to treatment after the initial stages. After they have recovered from the early effects of shock, and got over the unconsciousness, mental excitement, and extreme nervous tension and mental confusion, which characterize the "shock" at its inception, many men pass into a stage of convalescence in which there is still great restlessness, imperfect sleep, disturbing dreams, headache, and sometimes indigestion. When such symptoms persist, I have found simple charging, with the patient on an insulated platform connected to the negative pole of the static machine, an invaluable method, which, in the majority of instances, is rendered still more efficacious by arranging an electrode so as to give a steady but gentle head-breeze. Not only have I repeatedly seen rapid improvement under such conditions, but I have found that functional paralysis or weakening of limbs, which one often still finds in the later stages of the illness, will yield to the method. Under such special circumstances, success is more certainly assured when the functional nature of the weakness is carefully explained to the patient, and strong conversational suggestion given to him that there is no insuperable organic obstacle to his complete recovery.

With local symptoms, particularly pain, aching, or persistent weakness, mild sparking, or the breeze effect locally, is very helpful. Depression and tendency to lethargy are often

hazards of war is cicatricial formations following the passage of bullets or shell fragments through the tissues, for such missiles, instead of making a small clean track, disorganize tissues over a wide area surrounding their immediate direct line of flight. Consequently, as a result of hæmorrhage and tearing of muscles and fasciæ, a considerable amount of fibrous material is frequently formed, the subsequent hardening and contraction of which is responsible for many of the myalgias and neuralgias with which one has to deal in convalescent stages of simple wounds.

In the majority of cases of this kind, the passage of the galvanic current soothes pain and assists in absorption; but it is its ionizing powers that make the direct current such a valuable aid to treatment. By making use of these, one is able to augment still further the natural efforts of the system to absorb the offending fibrous masses. Of the various drugs commonly used in ionization, potassium iodide will be found very useful in this kind of condition. Large pads, soaked in a 1 or 2 per cent. solution of potassium iodide, should be placed over the affected area beneath an electrode, connected to the negative pole of the apparatus supplying the current, whilst the indifferent electrode should be placed over a large, well-moistened compress applied some little distance from the seat of injury. It is to be noted that comparatively strong currents—that is, 40, 50, or even 100 milliamperes—should be given whenever possible, and the generous use of lint in making the electrode-pads enables such currents to be administered without disadvantage. This is a very important point, for, in my opinion, one of the commonest causes of failure in methods of ionization is the use of too small pads and electrodes. Ionization with potassium iodide gives highly satisfactory results, and progress if slow may be hastened by massage or primary application of radiant heat, where some suitable apparatus is available.

It must not be forgotten that, in many of the cases in which pains, stiffness of muscles or joints are stubborn features of convalescence, there is probably some toxic or microbic process at work, like that producing the "rheumatism" (fibrositis and neuritis) of civilian life. Inasmuch as sodium salicylate is an exceedingly useful drug for ionization for these conditions, it is also of more advantage than

THE TREATMENT OF COUGH.*

By A. STEWART, M.B.

Physician to the Government Jubilee Sanatorium, Dalby, Queensland.

BEFORE beginning the consideration of the treatment of cough, a few minutes may be profitably spent discussing what cough really is, and what are its ultimate results.

Cough is merely a modification of the breathing, characterized by a deeply drawn inspiration, which is quickly followed by the closure of the glottis, and then succeeded by a number of quickly repeated expirations. If this definition be accepted as correct, the obvious inference is that cough is spasmodic, and probably due to some irritation in the respiratory tract.

There is a form of nervous cough, due to reflex action, which includes the so-called stomach cough, the reflex cough due to nasal polypi, foreign bodies in the ear, and teething. The stomach cough is now discredited, and as a rule is a term used merely as a "label," when the cause is unknown.

Numbers of cases have been reported by aural surgeons of repute, in which cough has been due to wax in the ear.

In this nervous group, there is the hysterical cough, described by Sir Andrew Clark as "the barking cough of puberty." This form has to be received with a certain amount of reservation, more especially when the cough persists for some considerable time. In these obscure cases very often an elongated uvula is the exciting cause. If this be not present, so-called hysterical cough must be looked on with suspicion. The longer one is in practice, the fewer are the cases of hysteria met with.

Having briefly noticed nervous cough, I will now rapidly review those of local origin. For the successful treatment of such cases it is apparent that the cause must, if possible, be ascertained. In pleurisy, there is a teasing, irritable cough, which, if frequent, as it usually is, increases the friction between the inflamed pleural folds. This cough and pain

* A paper read before the Queensland Branch of the B.M.A.

benefited by brisk sparking or effleuve up and down the spine—preferably after a preliminary charge.

3. CEREBRO-SPINAL GALVANISM.

One comes across a number of men who exhibit symptoms resulting from prolonged strain, due to shell-fire rather than to sudden shock from any particular explosion. These cases in their convalescent stages often resemble ordinary shell-shock at the same period of convalescence, but differ from them in that the psychological disturbance is usually not so profound. At the stage one sees them in the home hospitals, there are, commonly, general nervous irritability, hypersensitiveness, giddiness, tendency to depression, and indefinite pains in the back and limbs. Under such circumstances, I have found the descending galvanic current, with the anode over the cervical spinal region and each foot in a small bath, both baths being connected to the negative pole, gives excellent results. I have been struck by the way in which the men themselves speak appreciatively of this treatment, and am convinced of its great value as a nerve sedative in these cases.

The treatment may be varied, and rendered still more efficacious in responsible hands by placing the anode over the vertex; a large, thick, well-moistened pad should be used, and the hair thoroughly wetted before this is firmly fixed on to the scalp. The current which can be used under such circumstances, varies with the individual, and care must be taken to avoid shock, giddiness, or the production of any untoward symptom, the patient being carefully watched throughout the treatment. When the simple spinal application is being given, the treatment may sometimes be advantageously combined with the faradic current; but this combination should not be used when the application is cerebro-spinal. Considering that the investigations of certain observers point to the conclusion, that shell-shock and allied functional neuroses of war are commonly associated with minute hæmorrhages into the substance of the central nervous system, it is obvious that in the galvanic current, with its well-known capacities for assisting absorption, we may have here a more valuable therapeutic agent in this class of case than has yet been fully recognized.

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and the useful cough.

Amongst the first are classed the dry stage of acute and chronic bronchitis, the initial stage of asthma, and the irritable cough of pleurisy. The rational treatment of these fines itself down to an alteration, when possible, of the dry inflamed mucous membrane into a moist one. The dry bronchial surface must be stimulated to produce a sufficiency of thin liquid secretion, which can easily be got rid of by the useful cough. The cause being removed, the cough practically ceases. The remedies which produce this most promptly are the iodides, the action of which is often hastened when combined with an alkaline salt. Ten grains of iodide of sodium or potassium given four-hourly loosens the secretion in a very short time. In the worrying, dry, night cough of phthisis, caused by tough viscid mucus, ten grains of iodide, combined with a sedative if the irritation be excessive, administered at bedtime, gives great relief.

As an adjuvant to the iodides, expectorants are usually prescribed, but these, I think, are of very little value, and our knowledge of their action is purely empirical. The best expectorants are the iodides. They flush the whole of the bronchial tree with thin mucus, and nature does the rest. Before any appreciable use of expectorants can be obtained, the dose must be pushed so as to produce emesis, thus their effect is purely mechanical. Their striking use can be clearly demonstrated in a bad case of asthma, in which the lungs are mucus-logged; when vomiting has been produced by the administration of either apomorphia, ten grains of ipecacuanha, or three grains of tartar emetic, the effect is most striking, and grateful to the patient. Both apomorphia and tartar emetic get the credit of being depressants. Apomorphia has the advantage that it not only acts as an emetic, but is a sedative as well. In fact, Hare uses it in small doses with great success in the treatment of delirium. The depressing action can be counteracted by strychnine, given in the same injection. Ipecacuanha may be used with impunity, and the dose repeated if necessary.

The use of morphia in these cases should, if possible, be avoided. Though the sedative action is prompt, it really prolongs the attack by the diminution of bronchial secretion.

When the cough is excessive and produces irritation,

disappear with the advent of effusion.

The cough in the initial stage of pneumonia is usually not a very prominent symptom. During convalescence, it is a useful cough, and furthers resolution.

In acute bronchitis, the cough presents itself in two forms. The primary is dry and irritable in quality, and if the case be a bad one, in which the capillary bronchial tubes are affected, it is accompanied by a certain amount of cyanosis varying in extent. The second stage is a useful cough, and is the only means of getting rid of the glairy mucous discharge secreted. In chronic bronchitis, the same two stages can be recognized, varying in degree only. There is the dry stage, with the dry, useless cough accompanied by wheezing, and the wet stage, with profuse expectoration and a loose, useful cough. The same remarks apply to asthma. In phthisis, the cough may be divided into two classes, the laryngeal and pulmonary. The former is a paroxysmal cough, and the latter varying in different grades from the dry, tight, harassing cough with tough, thick mucus, to the loose cough with mucopurulent or nummular expectoration, according to the stage.

Before finishing this part of my subject, I may refer briefly to the cough of incipient thoracic aneurysm. This occurs in middle-aged men, without any apparent history or cause, is paroxysmal in character, is very often associated with sharp attacks of dyspnoea closely simulating asthma, and is often diagnosed as such. In text-books, this dyspnoea is described as being constantly present. In several cases I have seen, these attacks were definitely paroxysmal, so that they could not be distinguished from asthma. I may say I once tumbled into the trap, but am consoled by the fact that I have found the same error made by men whose medical acumen as diagnosticians is undoubted. In obscure paroxysmal cough of unknown origin in middle-aged men, an X-ray shadow on the screen will frequently reveal a small aneurysm of the arch or descending aorta near the pulmonary root.

Whooping cough and spasmodic croup will not be considered in this paper.

From the above remarks, it can be easily inferred that the therapeutics of this common and useful branch of practice divides itself naturally into two classes, viz., the useless

no remedy in the Pharmacopœia to equal it. The usual method of administration is to drop it into milk. Given thus, the creosote frequently gets entangled in the teeth, burns the cheeks and tongue, and irritates the pharynx. This can be avoided by mixing the creosote with glycerine in equal parts. Another very good way is to drop the creosote on half a tea-spoonful of sugar, and then fill up the remaining half with sugar. If this be objected to, it may be taken in gelatine capsules, mixed in olive oil so as to lessen its corrosive action, each dose being prepared separately, as the capsule generally leaks.

The dose of creosote should commence at five minims, increasing the dose daily by one minim up to twelve or fifteen. Doses over twelve minims generally disagree. The dose is given after meals, but with some it is best to give each dose just immediately before eating. In this way, the creosote is mixed intimately with the food and easily assimilated, whilst no eructations result. Unfortunately, creosote does not lend itself well to compound pharmacy. In cases of chronic bronchitis with wheezing and thick expectoration, I give the carbonate of creosote. The mixture I find best is ten grains of iodide of sodium, and twenty minims of carbonate of creosote, held in suspension by gum acacia, the soapy taste of the carbonate being disguised with cinnamon and chloroform water. I find, too, that this mixture does very well in the tightness and stuffiness of breathing of chronic phthisis, and the attacks of dyspnoea, almost amounting at times to attacks of asthma, the result of fibrosis in arrested cases of pulmonary tuberculosis.

I have gone into this part of my subject minutely, for the treatment of cough is about the most frequent in a practitioner's vocation, and attention to details means such a lot in private practice, very often turning the scales in favour of success.

The treatment of cough due to enlarged uvula, adenoids, and tonsils, is so obvious as only to require mentioning.

Then we come to that long-suffering, often maltreated, and sadly persecuted facial appendage, commonly known as the nose. If polypi are large and causing inconvenience, the sooner they are removed the better. If, on the other hand, they are small and cause no inconvenience, I fully agree with

the sedatives usually employed are opium, morphia, or some of its derivatives, the chief of which are heroin and codeia. Opium is generally given in the compound tincture of camphor, and morphia in the compound tincture of chloroform and morphia, or as the official liquor. The latter may be given in a very palatable and effective linctus, made up with hydrobromic acid, gum acacia and chloroform water. Heroin and codeia also can be given in the same way, omitting the acid with heroin, for it is easily decomposed. Enterprising American firms have advertised heroin extensively, but as a rule the use of these preparations is not to be recommended; still they very often come in as a pleasant change to phthical patients, who are often whimsical and most exacting.

The potency of morphia and heroin is just about equal, and is useful in "ringing the changes." When a patient has become accustomed to morphia, the sedative effect is lost after a time, then a change to heroin or codeia makes an agreeable and effective variation.

If by any chance morphia disagrees, and the cough is convulsive, a combination of chloral and antipyrin may be given with profit. I now dispense with the chloral and only use the phenazone, the dose of which should never exceed five grains. In a case of phthisis, when the cough is hard and distressing, with tough sputum, a good combination is ten grains of iodide of sodium, five grains of phenazone, and, if the cough is irritable, five or ten minims of tincture of chloroform and morphia, given four hourly. The phenazone does not lessen the secretion of mucus, and relieves the fleeting pains in the chest so commonly complained of. In such cases the late Sydney Ringer recommended tincture of gelsemium. I have tried this, and find it acts very well in some cases, whilst in others it is almost inert.

In these days, when the many forms of tuberculin are so popular, the uses of creosote seem to have been forgotten. When the cough is violent it does no good at all, but in cases in which it is mild and chronic, a course of it, extending over some months at least, does a great deal of good. In cases of suspicious bronchial catarrh (formerly known as pre-tuberculous cough), it has a wonderful effect, if it is properly given, and continued for a long period. In all cases of winter cough, the cough of chronic bronchitis, and bronchorrhea, there is

SOME NOTES AND THOUGHTS ON PARODONTAL DISEASE.

By JAMES E. BLOMFIELD, M.D.

It is now a good many years since Rigg drew attention to an inflamed condition of the gums and periodontal tissues, which was called, from its discoverer, Rigg's disease. This name gave way to the term *pyorrhœa alveolaris*, from the fact that pus oozed out of cavities and pockets between the gums and the teeth.

It is not a suitable term, for often no pus is visible, especially in the early stages. Parodontal disease is a better term, and is now more frequently in use. Much has been written on the subject, and much work has been done by bacteriologists to find its cause. At the present time, there is a choice of three agents—a streptococcus or mixed bacterial infection, an amoeba, and a spirochæte—no single one of which has been proved to be the *causa causans*. If I may be allowed an opinion on the limited experience of general practice with no special knowledge of bacteriology, I should favour the streptococcus. I can recall a very bad case of puerperal fever, commencing on the second day after parturition, due, I have no doubt, to a very septic condition of the mouth, produced by advanced parodontal disease, in which a swab from the uterus gave a pure cultivation of streptococci. Recovery from a very grave condition ensued by means of a vaccine made from the culture, aided by injections of polyvalent antistreptococcic serum.

In many of my cases, swabs from the interdental spaces and pockets have yielded cultures of streptococci, and similar organisms have been found in the blood in advanced cases of rheumatoid arthritis.

Well-defined conditions of parodontal disease are now recognized, though I cannot help thinking that there is considerable difference of opinion among us as to the importance that is to be attached to them as primary or secondary causes of diseased states. I think, too, that I am right in opining that slight cases of the disease are disregarded,

Francis in stating that they ought to be left alone. The most hopeless cases of asthma I have ever seen are those in which insignificant polypi have been snared, or turbinated bones have been removed or tinkered with.

With regard to cauterization of the nasal septum, while quite recognizing that many scientific truths have been consigned to the waste-paper basket before now, it must be remembered that Francis's method has been before the medical public for some twelve years, that it has been weighed in the balance and found wanting, after extensive trial, and bids fair to drop into the limbo of things forgotten. This is, after all, more significant than the most trenchant criticism.

Given a man of over-weight suffering from asthma and cough, put him on the diet formulated by Hare in his book, *The Food Factor in Disease*, and the asthma will disappear. There is nothing surer in therapeutics. The difficulty lies in the thin asthmatic. Get that man by climatic and other means to put on fat, and his asthma disappears too. These are the trying and often very hopeless cases. If, by any chance, the thin man does put on condition, the asthma disappears. If he still continues to put on weight till he is overweight, his asthma returns. When the fat man loses his asthma by dieting and still continues to lose condition, until he becomes decidedly underweight and positively thin, his asthma returns. *Primâ facie*, this may seem paradoxical, but it is a fact notwithstanding.



I very much doubt if many young men of the present day could have such a constant companion as a toothpick, unless it was accompanied by a tumbler of cold water.

Whether or not I am correct in my surmise, that since the early eighties septic gums have become frequently met with, I feel sure that it is since this period that appendicitis as we now know it, has come into prominence.

During the time of holding the appointment of house physician at my old hospital, I can only recall one case of the kind; it was called perityphlitis, and a clinical lecture was given on it, in which it was stated to be an inflammation around the cæcum. This was felt as a hard lump which would ascend upwards along the ascending colon before it disappeared. The treatment was rest in bed and opium.

My suggestion is that the period from the early eighties to the present time has seen a great increase of oral sepsis, due to parodontal disease in its early stages, and that there has been a corresponding increase in appendicitis.

Important as I believe the recognition of septic gums to be, it must not be supposed that this condition is always accompanied by bad health. There may be nothing more than a bad taste in the mouth in the morning or some "biliousness," evidenced by a yellowish tint of the skin in persons who make no complaint about their health. There seems in many cases, especially when the nervous system becomes involved, a personal susceptibility to the poisons generated in the mouth or to the bacterial invasions taking place there. Probably these people have inherited a vulnerable nervous system, which seems to be the primary factor in neurasthenia. Whenever the diseased condition of gums is discovered, it should be treated and, if possible, cured; for, under influences debilitating to the body, it is prone to gain virulence and produce toxæmic symptoms.

To determine the existence of septic gums, a casual inspection is quite inadequate. Among people who take care of their teeth, especially ladies and children, a casual inspection or massage will show nothing except sound or carefully stopped teeth, perhaps some crown or bridge work. When the symptoms point to oral sepsis, and there are no red lines or hyperæmic streaks on the gums to confirm the suspicion, the interdental spaces should be explored by a

and that the earliest stages are often overlooked chiefly from want of sufficiently careful exploration of the gums. It is the general practitioner who has the opportunity of seeing the earliest incidence of the disease. He it is who sees the beginnings—the end products are found in hospitals—and if he recognizes the earliest manifestation while it is still a superficial disease of the gum, treatment may be successful and his patient saved from long periods of ill-health, or from complications of the unavoidable diseases and accident to which our flesh is heir.

The public are becoming much interested in this disease, and the word pyorrhœa, like the disease, is in many mouths. Some will say that they are under treatment, others that they are cured—a remark which should be received with scepticism, for it is seldom found to be true—while others exhibit a laudable curiosity as to whence and how the disease has arisen, and why we hear so much of it nowadays!

These questions, though decidedly interesting, are not easy to answer, but certain considerations suggest themselves to my mind.

In my hospital days, in the eighties of the last century, there was no such name as pyorrhœa. Gingivitis or spongy gums were terms in use to describe a condition which was said to be associated with bad health—a scorbutic tendency it was called—and the teaching was that as the health improved the gums, too, would heal up, but no suggestion was made that the condition of the gums had anything to do with the bad health. About this time, or previous to it, there was a habit of young men to “sport” a toothpick. I do not know how the fashion originated, but I can recall a Lord Lieutenant of the county, who drove his four-in-hand with a toothpick in his mouth; in fact, he was seldom seen without it. Some of us may recall one of Nellie Farren’s popular songs at the Gaiety describing the young man of the day, in three lines of which it was recorded that he had—

In his hand a penny stick,
In his mouth a penny pick,
And a penny in his pocket,
Ladida, etc.

I mention these facts because they tend to show that bleeding gums cannot have been so frequent then as they are now.

alveolar processes, which passes into the cementum and dentine of the tooth without any interruption of continuity. There is no lining membrane to the socket of a tooth. Over this connective tissue is spread the epithelium, which is firmly attached to the tooth in front and behind, and may be seen, especially in children, extending upwards on the front aspect of the tooth, and, in favourable cases, when the interdental spaces are broad, completely surrounding the neck of the tooth.

In Piersol's *Human Anatomy*, the following passage occurs: "Whether the neck of the tooth is entirely surrounded by epithelium seems to vary in different individuals, as the teeth are not all equally close. As a rule, owing to the ordinary expansion of the crown from the neck at least a little of the gum is found between the teeth." I think it may be inferred from this statement that the interdental spaces are vulnerable spots, and that food-residues left therein make a comfortable nidus for the development of germs. These may penetrate gums badly protected in these places by a feeble or deficient epithelial layer, causing an infected granulation to form, from which the inflammatory process extends into the periosteum with all the evil consequences of a parodontal osteitis, leading to retraction of the gums and to separation and loss of teeth which are themselves sound. Another histological point of interest to our subject is presented by collections of lymphoid cells in the papillæ of the connective tissue in the neighbourhood of the teeth. These, no doubt, favour the absorption of microbes or their toxins into the body.

I will now give some notes of cases which have fallen under my observation, and the suggestions they afford as regards the disease and its treatment.

CASE 1.—In October of 1913, I was asked to see a school-boy about 11 years of age. His mother told me that he had had an attack of sickness during school some three days previous to my visit. He was sent home, and she put him to bed, but all that night he was delirious with vague and irrational ideas. She noticed that he had a difficulty in moving in bed. The next night was similar to the first. On the third day of the illness, I saw him. He was downstairs, and seemed a bright, intelligent little boy. He had great difficulty in bending his back, and used his hands to climb up his legs when rising to the upright position. His general health improved with

properly shaped toothpick or wooden match cut at one end into a blunt chisel edge, and at the other into a square blunt point. If the interdental spaces are too narrow to admit the chisel edge, the blunt point will penetrate if passed horizontally backwards just above the gum. When the interdental gum is unhealthy, blood oozes out at once and spreads along the margins of the neighbouring teeth, while the patient may complain of pain, but if the interdental space is healthy, there is no bleeding and no complaint of pain. Again, it will be found in more advanced cases that the end of the toothpick penetrates a certain distance between the gum and the tooth, especially at the sides of the triangular piece of gum which runs upwards between the teeth, and which can be pressed forwards like a flap disclosing the "pockets."

It may be objected to this method of examination that the toothpick injures the healthy gum, causing it to bleed, and that there is a risk of carrying infection from one part of the gum to another.

I do not think that either objection is valid. It is not every interdental space that bleeds, and if the bleeding spot is treated by dipping the tip of the toothpick into an antiseptic, it soon heals up, while the same measure would obviate the risk of new inoculations. I have used carbolic acid, 1 in 20, glycerine of carbolic acid, pure carbolic acid, liquid chloral hydrate, tincture of iodine, and lactic acid; all have been successful when used in this way. Probably there is a minute septic granulation which bleeds on being touched, and which is soon cured by the application.

There seems no doubt that the interdental gum is a weak spot, and a spot where food-residues linger. A simple experiment will demonstrate the last statement. Let anyone after a meal brush their teeth as hard as possible, and then use a toothpick in the ordinary way, when all doubt as to the uselessness of a tooth brush for cleaning the interdental spaces will be confirmed.

A consideration of the minute anatomy of the gums throws some light on this point. The gums are composed of dense connective tissue continuous with the periosteum, and covered externally by stratified epithelium. The connective tissue is continuous with the periosteum of the

alveolar processes, which passes into the cementum and dentine of the tooth without any interruption of continuity. There is no lining membrane to the socket of a tooth. Over this connective tissue is spread the epithelium, which is firmly attached to the tooth in front and behind, and may be seen, especially in children, extending upwards on the front aspect of the tooth, and, in favourable cases, when the interdental spaces are broad, completely surrounding the neck of the tooth.

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treatment, but he had marked rigidity in his back, and though there was no local tenderness, the prominence of the upper dorsal vertebrae suggested the possibility of early caries. There was as well impaired use of the right arm, the grasp of which was very feeble, and much weaker than that of the left. He complained a good deal of headache, which I attributed to migraine, of which there was a family history. Thinking that I had to do with a case of spinal caries, I sent him into our hospital for hip disease, and asked my partner, Mr. Sichel, to see the boy. He considered that the diagnosis of spinal caries was very doubtful. The consulting surgeon of the hospital then examined him on November 17, and pronounced it to be a case of spinal caries, though the site of the disease in the vertebral column, which he suggested, was much lower than the part I had suspected.

He was put to bed with the usual supports for spinal caries, and found to have no rise of temperature but an increased patella reflex. Attacks of sickness continued, and the headaches were very frequent. In looking for a cause for the perpetual sickness, I examined his teeth, which, at a cursory glance, looked as sound as a boy could have, with the exception of one vacant space where a tooth had been removed. On the gums was a slight red line along the dental margin, and when the interdental spaces were explored with a toothpick, they bled profusely at nearly every point. The gums were treated every day by toothpicks dipped in liquid chloral hydrate, after which the mouth was washed out with peroxide of hydrogen. After this treatment was begun on January 6, there was a gradual improvement in his symptoms, in the sickness, in the strength of the right arm, and in the general condition, so that, by January 28, he was allowed to sit up in bed. The vertebral column was stiff but not so rigid. A vaccine was prepared from the gums by Dr. Teale, and a course of injections given. On February 8, he was dressed and sat up, and on April 1 he was discharged from the hospital quite convalescent, though his mother continued the attentions to his teeth. Soon after his discharge he could run about, and has continued healthy and active since that date.

The points in this case to which I should like to draw attention are: The shortness of the disease and the rapidity of improvement when the cause was recognized, rendering the view that it was a case of caries with a coincident condition of the mouth untenable. No casual inspection would have revealed the true condition of the gums, and no treatment that did not embrace the interdental spaces would have been successful. Constant attention was required for this, which was faithfully rendered by the nurse in charge.

The incidence of the poison fell on the nervous system and alimentary canal. What would have been the course of the disease, if the condition had been unrecognized? No

teeth were extracted.

In August, 1916, I examined the mouth. The teeth were very good, the gums hard and healthy, with a good union to the teeth by the epithelial line, the interdental spaces being narrow, some tissue of which bled very slightly on passing a toothpick between the teeth. This satisfactory state was not caused by the care that had been taken, for often the teeth were not even brushed.

CASE 2.—B., a young lady of some 20 years of age, decidedly energetic and capable, contracted influenza of rather a severe type in October, 1915, which left her weak, with a bronchial cough. At my suggestion, her mother took her to the seaside, where, for a day or two, she seemed to be improving, but suddenly became ill again with violent sickness and "bilious feelings," a rise of temperature, sleeplessness, and fidgety restlessness. A doctor was called in, and he sent B. home. When I saw her, she seemed in a very weak state, with complete loss of appetite and a yellowish tint of the skin. She complained of severe pains in the upper part of the back and in both sides of the head and arms, with a difficulty of sitting up, in bed without her mother's help. The pulse was quick, but there was no rise of temperature. The patella reflex was exaggerated. When I asked to examine her teeth she said that her dentist had told her recently that she had the best set of teeth of any of his patients. This I found to be true as regards the teeth, but there were red patches and lines on the gums corresponding to certain teeth of the lower jaw. No pus or pockets were visible, but along the red line there was commencing a slight retraction of the gum as if the epithelial line was destroyed. I explained my views to her mother and set her to work on the interdental spaces with lactic acid on a toothpick and mouth washes of peroxide of hydrogen, giving some sedatives for the sleeplessness and fidgetiness. By degrees the pain in the back diminished, leaving great weakness in both arms, so that it was impossible to raise them to the head; the loss of power was greater in the right arm than in the left. This paresis slowly passed off, and by January, 1916, after a course of massage and exercises, the power of lifting the arms had recovered, though there was still some weakness in sight in taking an object off the table without any flexion at the elbow.

In August, 1916, I found her with the appearance of health, but the old vigour and vitality were missing. The right arm was not quite satisfactory. She could do most things with it, but, in playing tennis, she could not take the overhand strokes. There was no obvious loss of sensation, but she had dropped a saucer from her grasp without consciousness of doing so till she heard it break.

The gums were firm and healthy. On the right side of the lower jaw two interdental spaces bled insignificantly—if such a term may be allowed in their condition, but, on the other side, a spongy con-

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the temperature fell to normal, the weakness disappeared, and by the end of January, 1915, she was quite well again and able to have her teeth extracted where necessary.

The supervention of quinsy on influenzal tonsillitis is due, I believe, to a secondary action of parodontal streptococci.

The nerve symptoms associated with oral sepsis may be very slight, but the recognition of their cause is most important.

CASE 4.—R., a strong, healthy, middle-aged lady, sent for me because she had strange feelings in both legs, and could not tell with any exactness on what she was walking. I could find no cause of ill-health, but the patella reflex was exaggerated. Her teeth and gums were in bad state. Some were extracted under gas. She lost a good deal of blood from continued oozing, a condition which I find frequent in parodontal disease, and became feverish and ill. The strange sensations, however, disappeared from her legs. She had the remaining teeth removed, but a long period of invalidism followed before she was restored to health.

The complaint of neurasthenic symptoms, however mild, associated with dyspepsia, biliousness, and a yellow tint in the skin calls for an examination of the mouth. More than ever is this examination necessary in the severe neurasthenias, in which the discovery of the cause may lead to cure. I will relate two cases illustrating this view, in which high neurological authority was consulted without the recognition of the cause, the subsequent treatment of which resulted in cure. Probably any toxæmia may have the same result, but as oral sepsis is the commonest, it should be the first to be looked for.

CASE 5.—This concerned a gentleman between 50 and 60 years of age who occupied an important and responsible post. I was asked to see him in February, 1913, when he gave a history of having had recently an attack of influenza. He complained of always feeling tired, and could only do his work with great difficulty. He slept well, but a night's rest did not refresh him. The possibility of having to give up his work oppressed him.

I took the view that he was suffering from influenzal neurasthenia, and, after some days in bed, he went to the seaside. This change did him a little good, but as he felt unable to resume his work, I took him to a great authority on neurasthenia, who investigated him from the neurologist's point of view, and suggested him going to the Italian lakes for a prolonged holiday. He returned better but not feeling himself, and saw the specialist again in June,

dition was found at the sides of a tooth which had been twice stopped. It was the site of the only dental operations she had experienced.

B.'s mother had been under my care for many years with neuralgia in the head and neck. Some teeth had fallen out, and others had been extracted. She had had, in fact, parodontal disease of long duration. She had had as well two attacks of subacute appendicitis, and subsequently an operation for removal of the appendix. Her father consulted me some years ago for feelings of great weakness with indigestion and a yellow-tinted skin. His teeth and gums were in a very bad state. The teeth were removed and his health re-established.

The salient features of this case are—

The particularly healthy and active nature of the patient.

Her exceptionally good teeth.

The success of the simple method of treatment of the gums, all being cured with the exception of a patch near a tooth which had been the only tooth to receive the attention of a dentist. Probably here the disease had progressed too deeply for simple measures and demands removal of the tooth.

The parodontal disease of father and mother.

The simultaneous attack on the nervous and alimentary systems.

The outbreak of toxæmia from a latent sepsis as a sequela of influenza.

Sequelæ of inflammation are frequent and often puzzling. For many, I feel sure, an explanation will be found by a careful examination of the mouth, as in the following story :—

CASE 3.—In December, 1913, I attended L. T. for a severe attack of influenza, complicated by broncho-pneumonia. The malady ran an ordinary course, but convalescence seemed delayed by a continued rise of temperature and great weakness. The physical signs in the lungs were insufficient to account for the increased temperature, except on the idea that some secondary trouble was brewing, such as tuberculosis, with which she had been threatened when a young girl. An examination of the mouth showed bad teeth, spongy and bleeding gums. The gums were treated with lactic acid and a tooth-pick, followed by washes of peroxide of hydrogen. In a short time

from organisms present in the large intestine. The ascent of these organisms is favoured by the inadequate drainage which results from sagging of the large intestine. This sagging is caused by chronic constipation, or by an altered condition of the abdominal contents since man began to adopt the upright condition; its permanence is due to the formation of accessory folds of the peritoneum, brought into existence as an adaptation to the new arrangements.

The other school regards the toxæmia as caused by oral sepsis; in fact, a descending infection of the alimentary tract from poisons or organisms found in the mouth. My experience is definitely in favour of this view. I have examined the mouths of many patients suffering from appendicitis, and never failed to find a definite septic condition of the gums with or without decayed teeth.

It must be remembered that untreated parodontal disease is a life-long affection. There may be no, or very few, symptoms connected with its presence, but more often there are periods of ill-health, accompanied by indigestion in the stomach or bowels, with a certain amount of neurasthenia and myasthenia. This condition leads to stagnation of food residues, fermentation and flatulence, with distension of the bowels and weakness of the abdominal walls. It has, I believe, been determined experimentally in dogs, that when the stomach is distended there is a reflex relaxation of the wall of the abdomen. The result of these factors is a gastropnoxis, and further mechanical interference with the drainage of the poisonous intestinal contents. Secondary adhesions of the peritoneum develop, and the altered position of the bowels becomes permanently fixed.

Before the final results of this series of events are reached, much good can be done by the application of fine, well-fitting belts, and the administration of intestinal disinfectants, such as paraffin, kerol, etc., to inhibit the fermentation, and prevent the formation of flatulence, a treatment familiar to many medical men, and one which I have myself found most useful.

The gravest results of oral sepsis are found in pernicious anæmia, but even in this fatal disease the incidence falls on different systems of the body, as the two following cases show. The patients were a lady and a coachman. They

1913, who thought that he had improved, suggested the removal of a tooth, and certain medicines. Being impressed this time with the importance of oral sepsis in neurasthenia, I sent him, in October, 1913, to a dental specialist to determine what should be done to insure the absence of oral sepsis. Certain advice was given, but there was a great reluctance to carry it out completely, though some teeth were removed. I therefore got someone in the house to work away at the spongy gums with toothpick and liquid chloral hydrate, using peroxide of hydrogen as a mouth wash. This was thoroughly done once or twice a day, with the result that definite improvement set in, and I believe that he has kept well since that date. My instructions were never to neglect the cleaning and antisepsis of the gums, however sound they appeared to be.

CASE 6.—A middle-aged man under the care of my partner, Dr. Dick, who has kindly supplied me with the details.

In 1912, he became a complete invalid, suffering from pains at the back of the neck shooting up over the occiput, pains in back, with inability to walk. There was a certain amount of ataxia, not conforming to any type of spinal lesion. The knee-jerks were exaggerated. A neurologist saw him in consultation, and diagnosed his trouble as neurasthenia.

The fauces of the throat were red and fiery, and he had a loose catarrhal throaty cough.

He passed the summer of this year in a tent in the garden, and I saw him in September, when some improvement had taken place. He had flaccidity of the abdominal wall, with a difference in the abdominal circumference of $1\frac{1}{2}$ in. in the vertical and horizontal position. He was advised to wear a well-fitting abdominal belt. By the end of the year further improvement set in. He got through the year 1913 fairly well in an invalid fashion till in March, 1914, all his teeth were taken out. By the midsummer of this year, he was much better and has remained so since.

This is a short story of a long illness, presenting, to my mind, certain suggestions.

The neurasthenia was benefited by rest and feeding, but there was no cure till the teeth were extracted.

The application of a belt to the flaccid abdominal wall added to his comfort.

In the interesting discussions that have taken place in recent years on the subject of intestinal stasis and the toxæmic states arising from it, there seem to be two schools of thought as to the cause.

One school favours the views so ably expressed by Sir Arbuthnot Lane, who regards the toxæmia as caused by an ascending infection of the upper part of the alimentary canal.

and to use mouth washes. This treatment he faithfully carried out all the years of his illness.

CASE 8.—In August, 1910, I was asked to see Mrs. G. She told me that she had been ailing for some time, and dated the beginning of her illness from a bilious attack caused by eating some doubtful fish some months previously. She appeared to be a healthy woman of a clear, bright complexion, leading an active life, which included the cares of a large house, the management of a family, riding, driving and hunting as relaxations. She informed me that she had been under treatment by a dentist for pyorrhœa, which he said was cured. She had also had some hæmorrhoids injected with carbolic acid. Her chief complaint was that she was always tired, and could not do what she formerly did with pleasure. She told me of a symptom which I had never heard described before, viz., that the swallowing of food as it went down the gullet caused acute pain, as if passing over a sore place. There was nothing to be seen in the throat.

I regarded the case as neurasthenia, and procured for her a reliable massage nurse. Further observation showed that she had a slight rise of temperature, that the patellar reflex was exaggerated, and that bacillus coli was present in the urine. With massage, feeding, and rest, she improved considerably but not with the rapidity I expected, so I suggested a consultation. This took place in December, 1910, when she was examined by a well-known authority on the disease, who pronounced it a case of neurasthenia of medium severity, which would benefit more rapidly by treatment in a nursing home. This was arranged, and she left home in expectation of a rapid cure. I heard of her from time to time, but the reports I received from her husband were by no means satisfactory. She found the home very irksome and feeling herself worse, she implored her husband to bring her home. This he did, and I received a letter from the medical man in charge to tell me that Mrs. G. was very ill with a high temperature.

I visited her on her return, and found a marked change. She had a high temperature, ranging about 104°. She was pale instead of florid. She was so weak that she could hardly raise her head from the pillow, pulse weak and rapid, with a systolic murmur all over the cardiac area. She had several rigors. The urine was foul and turbid from bacillus coli. The diagnosis of pernicious anæmia was confirmed by an examination of the blood. She was given salicylate of bismuth, which produced some improvement in the temperature, but the rigors still continued. On January 27, 1911, Dr. de Haviland Hall saw her in consultation, and arsenic in increasing doses was tried with little real improvement. I then gave injections of polyvalent antistreptococcic serum with encouraging results, and continued them till she had had eighteen.

In March, 1911, Dr. W. Hunter met me in consultation. He agreed with the diagnosis, and demonstrated to me the buccal and lingual lesions which he considered were the cause of the disease.

both became ill about the same time ; both were apparently cured of the anæmia, but died about the same time some five years after the beginning of the disease. In the case of the lady, the involvement of the spinal cord was the chief feature, reducing her to the condition of a helpless cripple. She died from an acute febrile exacerbation, due, I believe, to a septic condition of the gum around some unextracted teeth ; whilst the coachman, all of whose teeth had been completely extracted. sank slowly away from typical asthenia, though the presence of persistent oral sepsis was evident in his last weeks by painful sores on the gums. He had a slightly spastic gait, exaggerated knee jerks, and occasional pains in the sciatic nerves, but throughout his illness complained more of abdominal discomfort and indigestion than of these slight nervous symptoms.

CASE 7.—M. C., the coachman, I had known for many years as a rather full-blooded man. He consulted me for what I thought was indigestion. By degrees he became pale, which I attributed to the loss of blood he sustained from bleeding hæmorrhoids, but, as this bleeding stopped, there was no improvement in his aspect. Examination of his mouth showed the red streaks and patches on the tongue and cheek, with bad teeth and gums. He had a rise of temperature and exaggerated knee jerks ; some teeth were extracted. He was admitted to Charing Cross Hospital, where the diagnosis I had made of pernicious anæmia was confirmed. He left the hospital in June, 1910, very little improved. He had a course of hypodermic injections of iron, arsenic, and strychnine, which had a good effect, and, in September, all his teeth were removed. In 1911, he had a second course of injections. In 1912, he could do the best part of his work as a coachman. During 1913 and 1914, he looked free from anæmia, and carried on his work with a little assistance, paying me occasional visits for what he called indigestion. This satisfactory state of things continued till 1915, when he had an attack of influenza, which seemed to throw him back. He lost his colour, his heart became weak, and he felt tired and unfit for work. Digestion and appetite failed, with constant feelings of discomfort in the abdomen. Another course of injections failed to do good. In June, he had a severe attack of diarrhœa. The gums became worse, with red patches or distinct pustules, from which swabs were taken and sent to Dr. Teale, with a portion of the stools. From the cultivation, obtained from these specimens, a vaccine containing streptococci and bacilli coli was prepared, but had no appreciable effect, and he slowly sank into a state of extreme pallor and emaciation, dying in January, 1916. At the time of the discovery of the buccal and lingual lesions in the mouth, he was shown how to treat each patch with 1 in 20 carbolic acid,

are not primarily heart cases." "Even when we find such marked abnormalities as increased rate, systolic murmur and an increase in the size of the heart, the cause of these signs ought not to be looked on as disease, but merely a part of the manifestation of general disease," and he notes that we see all these phenomena well marked in people in civil life who are suffering from some infective organism; "in a great majority of cases we get a history pointing to an illness which preceded their breakdown." "Some changes are produced in the economy in the blood, central nervous system or heart muscle, which impairs the functional activity of these structures," by bacterial invasions or their toxins.

No suggestion as to the source of these bacterial invasions or intoxication is made, but to one, who has read the cases I have related, there will find no difficulty in suspecting the mode of origin of some of them.

THE METHOD OF SPREAD.

If I am correct in my view, that there has been a great increase in oral sepsis during the last three decades or more, produced by undetected or insufficiently treated parodontal disease, the question arises as to what has brought this about. I believe there are two factors: Family life and dental manipulation. On several occasions, when I have had to point out to a mother the unsatisfactory state of her gums and mouth, she has continued the investigation to her children, and has reported that she has found the same condition. I recall one family in which the mother had suffered with muscular and arthritic rheumatism all her life, and had had, in addition, a gastric ulcer. Her teeth were good, but her gums, in the interdental spaces, were badly septic. Her little boy had rheumatic pain and lumbago, which his mother considered he had inherited from her, but an examination of his gums suggested a direct infection rather than an inherited diathesis. I will now give notes of two cases illustrating the probability of these two modes of infection.

CASE 9.—In July, 1916, I was asked to see a little girl, R. P., because she had pains in her stomach and was feverish. I found the temperature 101°. The abdomen was tender to pressure, but there was no localized tenderness to suggest appendicitis. She was still

He advised the removal of certain teeth, and the treatment of the local lesions with carbolic acid, 1 in 20, on a small swab. These measures were carried out and definite improvement set in, but symptoms of involvement of the nervous system began to arise, loss of sensation in various parts of the body, especially in the finger tips, loss of the muscular sense with spastic contracture of the limb. She had no idea as to the position of her limbs, and the legs became crossed over each other with such strength that it became very difficult to empty the bladder by catheter—an operation that was occasionally necessary.

She spent the autumn and winter at the seaside, by which time the colour had returned to the face, and the blood-count was nearly normal.

She returned home in June, 1912, still keeping fairly free from the symptoms of anæmia, but in a neurasthenic state, which she attributed, I think with justice, to the too energetic treatment she had received at the seaside, by baths and massage. The loss of power in the muscles and of sensation in the skin and muscles remained the same as before. Two nurses were necessary, as she could not turn herself in bed without assistance. Dr. Kinnear Wilson saw her in consultation, and gave a bad prognosis as to the possibility of her regaining any power or even retaining what she had. By means of walking-chairs and carrying-chairs she was able to spend a good deal of time outdoors, and to undertake occasional carriage or motor drives.

I saw her at long intervals during 1913, in which year no improvement took place, and then lost sight of her till 1915, when I was asked by a colleague to see her in consultation. She had become decidedly worse. The pallor had returned, the temperature raised, and the pulse quick and feeble. The gums were red, spongy, and bleeding around the remaining teeth. The condition of the nervous system was much the same as when I last saw her. I could only suggest, as a desperate measure, the removal of the remaining teeth to stop the new attack of sepsis. This was done, but she died soon after the operation.

The cases which I have described have been chiefly remarkable for the action of the oral sepsis on the alimentary canal and the nervous system. There can, however, be no reason to think that the other systems of the body escape. Septic phlebitis in connection with oral sepsis is well known. I have no suggestive cases to record as to the poisoning of the cardio-vascular system, but I have no doubt it is present, a suspicion which finds confirmation by some passages I will quote from a paper by Sir James Mackenzie in *B.M.J.* of January 22, 1916, on the soldier's heart:—

“In at least 90 per cent. of the cases that have been certified and treated as heart affections we find that they

previously mentioned.

In the previous cases and notes, I have given evidence to show that many cases of the earliest stages of parodontal disease and the consequent oral sepsis are easily overlooked, and that the disease is of very frequent occurrence. I have pointed out as well the probable ways in which the disease is spread. Now what can be done to prevent it? In the first place, I think it is clear that brushing the teeth in the ordinary way is quite insufficient to insure real cleanliness and keep the interdental spaces free from food residues. If every tooth brush had as companion a box of suitable toothpicks, one of which was used every night and morning to every interdental space before the brush was applied, the mouth afterwards being washed with an antiseptic wash, I believe the interdental spaces and subjacent gum could be kept in a healthy condition. In the next place, I should like to see a sterilizer kept boiling in every dentist's operating room for the reception of instruments after they have been used. The family infection could no doubt be prevented, if more attention was paid to the early stages of the disease, and more stress was laid on its absolute cure. There would then be less septic matter to convey to others. A weekly boiling of the spoons and forks would not be out of place.

SUMMARY.

During the last three or four decades, there has been an increase of parodontal disease contemporary with an increase of appendicitis.

This increase has been produced by infection by means of family life and dental manipulations.

The earliest stage of the disease is not easily recognized, because it arises in the interdental spaces.

Untreated, it is a life-long disease which may produce no symptoms, or be responsible for toxæmia of varying severity under depressing influences.

Whenever found, the disease should be treated, for while it remains on the surface of the gums, it is amenable to simple measures without extraction of teeth.

Every effort should be made to avert the spread and incidence of the disease.

feverish on the next day, and complained of her mouth being sore, and of a painful pustule on the finger. Examination of the mouth showed an acute stomatitis and gingivitis, with small ulcers on the tongue and at the angle of the mouth, rendering eating painful. The inflammation soon subsided to casual observation, but an examination with a toothpick showed that the gums were soft, bleeding, and detached from the teeth.

I explained to her mother how she was to treat the condition with lactic acid and a toothpick and with mouth washes, when she told me that she herself had pyorrhœa, and was under a dentist, who wished to extract some of her remaining teeth, many of which had already fallen out. She said that R. P. had never had any manipulation from a dentist, and suggested that her little child had caught the conditions from her, a view in which I could acquiesce as being highly probable.

CASE 10.—In February, 1916, a lady consulted me for a pain in the right knee. About a year ago she fell and bruised the outer side of this joint; she had to lie up because there was some swelling. Since then the right knee has occasionally given signs of pain and weakness. The left knee has also been affected in the same way at times.

Examination showed that the right knee was more swollen than the left. The movements were free, with an occasional soft click. The movements in the left knee were free, with a similar click. Examination of the mouth showed a particularly good set of teeth, with firm, pale gums. On the left side was a stopped premolar, the mucous membrane on each side of which bled freely on being probed. It was the only dental manipulation she had undergone, and suggested to my mind that it was a point of inoculation which, up to the present, had not had time to spread. Compare Case 2.

CASE 11.—Some time ago I was asked to see a boy, about 10 years of age, because, though apparently well and possessing a good appetite, he had, on two consecutive nights, been seized with vomiting. There was nothing in his diet or general health to account for these curious attacks. He had no indigestion, and took his food well. On enquiring about his teeth, his mother told me that some weeks previously he had fallen down and knocked out an upper incisor. She picked the tooth up and took it to the dentist, who replaced and secured it by wire. It united well, and, at the time of my visit, he was wearing a small plate to give it support. On taking out this plate, the replaced tooth and surrounding gum seemed firm and healthy, but the gum around the neighbouring tooth on one side, which had been used to support the plate was red, inflamed and bleeding. The plate was left out, the gum treated with antiseptics, and no more of this curious and apparently causeless vomiting occurred.

These three cases suggest to my mind most strongly the two possible modes of propagation of the disease I have

previously mentioned.

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Every effort should be made to avert the spread and incidence of the disease.

OBSERVATIONS ON A SEVERE CASE OF TETANUS TREATED WITH REPEATED INTRATHECAL INJECTIONS OF ANTITOXIN.—RECOVERY.

By C. WORSTER-DROUGHT, M.B., etc.,
CAPTAIN R.A.M.C. (T.C.):

Royal Herbert Hospital, Woolwich.

As the problem of a moderately successful method of treatment in cases of severe tetanus still awaits a definite solution, the record of the following case, with observations thereon, may be of some interest at the present time. As far as I am aware, the gross amount of antitoxic serum administered was considerably in excess of that mentioned in hitherto published records; this fact may serve as an additional excuse for the publication of this case.

Private M., æt. 24 years, while in the trenches, was wounded by shrapnel in the left ankle on the morning of July 1, 1916. He lay where he was hit for about half-an-hour before being removed to the dressing station, but a field dressing was put on within a few minutes of the infliction of the wound. He was then transferred to the base, and finally arrived at hospital in England on July 4. From July 1 to 4 the wound was dressed twice daily.

I am indebted to Capt. Craster for the notes of his progress from arrival until July 8. On admission, there was a penetrating circular wound at the junction of the lower and middle thirds of the left ankle. The entry, two and a half inches in diameter, was at the external border of the tibia, the exit, of about the same size and at the same level, being just over the fibula. The wound was very septic, with considerable swelling and œdema of the surrounding tissues; it was irrigated, and a eusol dressing applied. Radiographic examination showed the bones to be quite intact. A label attached to the patient stated that a prophylactic dose of antitoxin (500 units) had been given on July 1. Two days after admission (July 6), the wound was explored, irrigated, and drained under general anaesthesia. No metal fragments were found, but some pieces of cloth (puttee) were removed. Next day the wound was looking better, draining well, and the surrounding parts were not so inflamed. During the evening of the day following (July 8), at about 10 p.m., the patient complained of some slight stiffness in the neck; there

were no other symptoms, and he slept well that night.

On the following morning (July 9), when visited, he showed well-marked rigidity of both the anterior and posterior muscles of the neck, some degree of trismus, and complained of cramp-like pains in the back. The expression was anxious, swallowing was a little difficult, and, on observation, he was seen to be having slight spasms of head-retraction about every 10 to 15 minutes. The pupils were normal, and there was no nystagmus; the knee and ankle jerks were equal and not exaggerated. The right plantar reflex was flexor, and that on the left (the wounded limb) was not obtained. There was some tonic spasm of the abdominal muscles; the abdominal and epigastric reflexes were not elicited, but the cremasterics were slight on each side.

As the patient had already received a prophylactic dose on July 1, according to his label and own statement, anti-anaphylaxis was first induced before proceeding with treatment. This was done by the method mentioned by C. H. Browning,¹ and based on the work of Besredka and Friedberger, viz., 5 c.c. of antitoxin serum were diluted with 50 c.c. of normal saline. Of this mixture 1 c.c. was injected intravenously; after four minutes this was followed by a further 3 c.c., two minutes later 10 c.c. were given, and, finally, after another two minutes, 25 c.c. The serum was run in by the ordinary method, the rubber tube of the apparatus being clipped during the intervals. Half an hour later, the patient was given the following amounts of antitoxin in the situations indicated:—

Intrathecally	-	-	-	8,000 units (U.S.A.)
Intravenously	-	-	-	12,000 „
Intramuscularly (in the wounded				
limb)	-	-	-	4,000 „

The intravenous injection was given not with the idea of influencing the toxin already in the nervous tissues, which, as Noon, Park, Nicole and others have shown, is dealt with by the intrathecal antitoxin, but rather to neutralize any in the general circulation.

In the evening, he complained of excessive tightness across the chest; severe spasms occurred about every quarter of an hour and continued throughout the night. Consequently, sleep was very limited. Next day (second) there was little change, with the exception that the spasms seemed rather more severe. He was able to swallow small quantities of milk, but the attempt more frequently than not provoked a spasmodic seizure. 10,000 units of antitoxin were given intravenously to neutralize any remaining toxin, and 8,000 intrathecally. During the night he was somewhat better, took 24 ozs. of milk, and slept from four to five hours. On the third day, there was extreme retraction of the head and moderate opisthotonus; the slightest attempt at swallowing brought on a convulsive spasm. 8,000 units were again given intraspinally, and

this dose was continued daily until the twelfth day. From the third to the sixth day, opisthotonus became increasingly pronounced, risus sardonicus was well marked, he was quite unable to swallow, and seizures were frequent. During this period he was given nutrient enemata. On the morning of the sixth day, he was able to open his mouth to a small extent, and could swallow a little, though there was some choking after each drink; he was less restless during the night, and the spasms were of shorter duration, their frequency being undiminished. Head-retraction was not so extreme. On the seventh day the seizures were certainly less severe, and the intervals between them longer; they were, however, precipitated by any attempt to speak. The patient indicated his chest and tongue as the site of pain; his tongue had evidently been bitten, in spite of precautions, during the previous convulsive spasms. He slept at intervals most of the afternoon, and, on awakening, was able to swallow better. From then until the tenth day, the patient's condition remained much the same; spasms occurred from time to time, usually being more frequent in the morning and late in the evening. Head retraction and trismus persisted to a considerable degree, with a tendency to opisthotonus; he was swallowing moderately.

On the eleventh day, the spasms were fewer and much diminished in severity; he spent a fairly comfortable night, and, next morning (twelfth day), head-retraction and trismus were distinctly less, and the tip of the tongue could be protruded. He had only a few slight spasms during the day. For the first time sedatives were not given, and the daily intrathecal injection of antitoxin was omitted; the latter was resumed next day (8,000 units), and given every other day until the nineteenth, viz., on the thirteenth, fifteenth, seventeenth, and nineteenth days. From the twelfth day onwards he rapidly improved up till the nineteenth day; a few slight spasms only occurred at intervals, head-retraction and trismus gradually diminished, and he was able to take eggs on the fifteenth day. On the twentieth day no spasms occurred, and all symptoms seemed to be absent. Next day he was able to open his mouth fairly widely, to protrude his tongue, and to flex his head normally.

For the lumbar punctures and serum injections, chloroform was the anæsthetic used at the first twelve administrations; on the thirteenth and fifteenth days, nitrous oxide was given, while on the nineteenth and last day, it was performed without an anæsthetic.

The intrathecal injections of antitoxin were carried out by the gravitation method, using an ordinary funnel and tube; no untoward result, such as respiratory failure, ever occurred. The method is perfectly safe, and, as suggested elsewhere⁵ with regard to anti-meningococcic serum, Sophian's precaution of registering the blood-pressure as an ocular guide to injection by gravity does not appear to be at all necessary. The end of the bed was raised on high blocks for an hour after each injection, to facilitate the upward flow of serum. A serum rash appeared on the tenth day of the disease, but there was never any sign of anaphylaxis. The total amount of antitoxin given

was as follows :—

Intrathecal.

First to eleventh days inclusive.

8,000 units per day - - 88,000

Thirteenth, fifteenth, seventeenth and nineteenth days.

8,000 units per day - - 32,000

Intravenous.

First day —12,000 units;

Second day—10,000 „ - - 22,000

Intramuscular.

First day - - - - 4,000

Total - - - 146,000 units.

The serum given intrathecally was Burroughs and Wellcome's unconcentrated* antitoxin (series D. 4990), that given intravenously and intramuscularly being Lister Institute antitoxin (T. 41). Sedatives employed were chlorotone (grs. 15–20) every three or four hours, whenever the patient was able to swallow; when unable, injections of hyoscine (gr. $\frac{1}{100}$).

At the onset of tetanus, an open dressing, consisting of a single layer of gauze, was placed on the wound and kept continually moist with hydrogen peroxide; syringing, too, was frequently carried out with the same fluid. On the third day, the wound was considerably cleaner; while, on the seventh, all oedema had disappeared from its vicinity. Healing was gradual, and not complete until nearly three weeks after the final disappearance of the tetanic symptoms. On July 18 (three days after the onset of tetanus), cultures from the wound were taken by Mr. Kenneth Goadby. The findings are noted at the end of this communication (page 187).

The cerebro-spinal fluid showed some points of interest. On lumbar puncture, the fluid was allowed to escape until the rate of flow was about 6 drops per 30 seconds. On the first day, 50 c.c. of cerebro-spinal fluid were obtained; the pressure was decidedly increased, the fluid was quite clear, and its reducing action well marked. The fluid of the second, third and fourth day showed moderate turbidity, gradually increasing daily; on standing there was a semi-purulent deposit, microscopically consisting of polymorphonuclear cells and a few lymphocytes. Cultures were sterile, but the fluid did not reduce Fehling's solution. The amount obtained varied from 50–70 c.c. per diem. On the fifth day, the fluid was again quite clear and remained so until the ninth day, when it showed a distinct yellowish tinge; there was no deposit, and the cells were not above the normal in number. The reducing action returned on the fifth

* No albumen removed by fractional precipitation.

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EXCISION *VERSUS* AMPUTATION IN CERTAIN CASES OF SARCOMATA OF LONG BONES.

By P. J. BYRNE, F.R.C.S.

Clonmel.

SARCOMATA occur in all connective tissue, but are most frequently found in bone, of which they form the commonest variety of tumour. The site-incidence of sarcomata of bone, given in the order of frequency, is as follows: jaw, femur, tibia, humerus, radius, fibula. They are found throughout the entire range of life, but appear most often in the third decade, viz., 20 to 30 years.

In May last I was consulted by a youth aged 18 years, who had an enlargement of the head of his right fibula, which he first noticed about nine months previously. There was no definite history of injury. On examination, the tumour was smooth, not painful on pressure, the main portion extended backwards into the popliteal space, there was no paralysis, although the external popliteal nerve could be felt tightly stretched over the outer aspect. The patient complained of pain, though not very severe, especially at night time, and he walked with a slight limp. An excellent X-ray photograph taken by Dr. Watson, Dublin, showed an encapsulated tumour not unlike an osteoma. The diagnosis, however, was in favour of sarcoma, subsequently proved correct by microscopic examination.

The patient would, on no account, submit to an amputation, which was mentioned, but not recommended to him, and, as the tumour seemed distinctly encapsulated, I advised removal of the upper half of the fibula, to which he readily consented. This was accordingly done on May 25. An incision was made along the postero-external aspect of the fibula; the external popliteal nerve was found tightly stretched over the tumour, and had to be freed for a considerable distance both in an upward and downward direction, to relieve tension and enable the mass to be removed from underneath. The muscles were dissected off the bone,

tetanus.

A good many long thin Gram-positive threads were seen, but no sporulation was observed in these.

B. malignant oedema (Koch),

B. perfringens,

B. coli communis,

Streptococcus (long chained),

Staphylococcus aureus,

were isolated in pure cultures. The cultures were "enriched" in two weeks' time, but no B. tetanus or any end-sporing organism was observed.

REFERENCES.

¹ C. H. Browning: "Tetanus," *Brit. Journ. Surgery*, Vol. IV., No. 13, 1916.

² K. Goadby: "Treatment of Tetanus," *THE PRACTITIONER*, May, 1916.

³ Goldschieder: *Berl. klin. Woch.* No. 10, 1915.

⁴ Nivière: *Bull. de l'Acad. de Méd.*, 1915, March 30.

⁵ Worster-Drought: "Observations on the Treatment of Cerebro-spinal Fever," *B.M.J.*, November 18, 1916.

Practical Notes.

TREATMENT OF ALOPECIA.

Gougerot advises that the treatment should be both ætiological and symptomatic, including under the former anti-syphilitic and anti-seborrhœic methods, removal of all dental lesions, and so forth. However this may vary, the symptomatic treatment remains the same for all cases. It is directed to setting up a new growth of hair by local stimulation. In an obstinate case, for example, it is necessary first of all to *seek for and treat all the possible causes*. These will be found in lesions of the teeth and of the nose, in gastro-intestinal, utero-ovarian, genito-urinary, thyroid, and especially nervous disorders. Treatment for these will include cold hydrotherapy, hot sulphureous douches, electrification, etc. The patient must be examined thoroughly, and all the disorders mentioned as well as errors in hygiene must be corrected. The general condition must be improved, if necessary, by injections of cacodylate of soda, administration of glycero-phosphates, a change at the seaside or on the mountains, gymnastic exercises, etc. Opothrapy with thyroid or ovarian extracts may be tried. It is wise to carry out a Wassermann test.

The scalp must be submitted to a good hygiene. No hat should be worn. The hair must be combed and brushed in the direction of its growth and not dressed *en brosse*. The condition of the skin must receive due attention as required. On two evenings a week, the head must be well washed with coal-tar soap, and, on the following morning, if necessary, the hair must be greased with a spirit lotion containing oil or an emulsion (collosol). It is not practicable to cut the hair short, as recommended by some authorities. On the contrary, the patient should wear the hair long in order to hide the bald patches.

To stimulate the re-growth of the hair, the patient must rub into the scalp a stimulating lotion every morning or evening or even twice a day. There are several forms of such a lotion.

(1) R	Liquoris Formaldehydi	-	-	-	℥x.-xxx.
	Acidi Acetici	-	-	-	℥xv.-3i.
	Spiritus Rosmarini	-	-	-	3ij.
	Tincturæ Cantharadis	-	-	-	3iiss.
	Alcohol	-	-	-	ad 3x.

Misce. Fiat lotio.

Quinine may be substituted for the formaldehyde.

(2) R	Hydrargyri Perchloridi	-	-	-	gr. x.
	Olei Ricini	-	-	-	℥xx.
	Acidi Acetici	-	-	-	℥xlv.
	Spiritus Lavandulæ	-	-	-	3v.
	Alcohol (90°)	-	-	-	ad 3xx.

Misce. Fiat lotio.

which was divided about its middle well below the growth. The lower end of the upper fragment was there, drawn outwards, and, by keeping the knife close on the bone, the anterior tibial artery was not wounded. The muscles were brought together by kangaroo tendon sutures, and the wound closed. Primary healing followed, and the patient was allowed out of bed at the end of three weeks.

I have seen him several times since; he walks perfectly, and the loss of the upper half of the fibula seems to make no difference as far as the utility of the limb is concerned. Had the leg proved weak or unstable, I intended to fill up the defect by a transplant taken from the crest of the tibia on the opposite side. This forms a scaffolding about which new bone grows, and a complete reproduction should take place.

Murphy, of Chicago, is, I believe, the pioneer of the local removal of bone sarcomata when the tumour is encapsulated and the type not of the most malignant character. He believes that, in these cases, local operation gives the patient as good a chance as an amputation, and has quoted instances of the removal of portions of the tibia, fibula, femur, etc., followed by a graft, leaving a useful limb. Recurrence, when it takes place, is distal, not local—the same is the rule after amputation. The advantages of excision in suitable cases over amputation are, first, it is usually possible to get the consent of the patient, at an early date, for an excision; hence the chances of metastasis are less. Consent for amputation is usually only given as a last resort. Second, a useful limb can generally be obtained by filling in the defect with a graft, though, apparently, this refinement is not necessary in the case of removal of the upper part of the fibula, which, as already mentioned, does not interfere with the utility of the limb.

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	Acidi Acetici	-	-	-	℥xv.-ȝi.
	Spiritus Rosmarini	-	-	-	ȝij.
	Tincturæ Cantharidis	-	-	-	ȝiiss.
	Alcohol	-	-	-	ad ȝx.

Misce. Fiat lotio.

Quinine may be substituted for the formaldehyde.

(2) R	Hydrargyri Perchloridi	-	-	-	gr. x.
	Olei Ricini	-	-	-	℥xx.
	Acidi Acetici	-	-	-	℥xliv.
	Spiritus Lavandulæ	-	-	-	ȝv.
	Alcohol (90°)	-	-	-	ad ȝxx.

Misce. Fiat lotio.

Gaucher recommends the addition to this of:—

R	Liquoris Formaldehydi	-	-	-	℥iij.
	Resorcini	-	-	-	℥iss.
	Chloralis Hydratis	-	-	-	℥iij.-vj.
	Tincturæ Cantliaradis	-	-	-	℥ss-ij.
	Tincturæ Jaborandi	-	-	-	℥j.-iij.

(3) Darier orders:—

R	Naphthol-β	-	-	-	gr. iss.
	Hydrargyri Perchloridi	-	-	-	gr. iij.
	Resorcini.				
	Ammonii Chloridi.				
	Chloralis Hydratis	-	-	ana	gr. viij.
	Spiritus Lavandulæ	-	-	-	℥iijss.

Misce. Fiat lotio.

(4) R	Pilocarpinæ Hydrochloridi	-	-	-	gr. viij.
	"Rum."				
	Spiritus Camphoræ	-	-	ana	℥iiss.
	Glycerini	-	-	-	℥j.
	Alcohol (80°)	-	-	ad	℥iij.

Brocq adds to this:—

Tincturæ Cantharadis	-	-	-	℥i.
Olei Santali.				
Olei Gaultheriæ	-	-	ana	℥iv.

(5) R	Liquoris Ammoniaæ	-	-	-	℥i.
	Olei Terebenthinæ	-	-	-	℥ss.
	Spiritus Camphoræ	-	-	ad	℥iv.

Misce. Fiat lotio.

- (6) To a tumbler-ful of infusion of walnut leaves add from 1 to 3 tea-spoonfuls of ammonia and from 3 to 9 tea-spoonfuls of rum. To this may be added, at option, 3 tea-spoonfuls each of coal tar *saponin* and spirits of camphor.

Counter-irritation.—When the state of the epidermis allows it, twice a week in the evening, or in the morning before applying the stimulating lotion, the scalp must be irritated. There are many ways of doing this: brushing with a hard brush or with a stiff-bristled T-brush; rubbing in with a hair glove a spirit lotion, or acetic acid 1 to 3, chloral hydrate 5, and ether 25; swabbing with tincture of iodine, pure, diluted with spirit or with the addition of from 5 to 10 per cent. of acetic acid; carbolic acid, tincture of iodine, and S.V.R. (60°) equal parts, diluted, if necessary, with 3 parts of spirit; 10 per cent. of lactic acid; irritant applications, blistering fluid,



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Pure, Soluble Milk Protein	75 per cent.	Sodium Glycerophosphate	2 per cent.
Dextrin-Maltose	20 "	Calcium Glycerophosphate	2 "
		Magnesium Glycerophosphate	1 per cent.

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PRACTICAL NOTES

Gaucher recommends the addition to this of:—

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	Resorcini	-	-	-	℥iiss.
	Chloralis Hydratis	-	-	-	℥iij.-vj.
	Tincturæ Cantharadis	-	-	-	℥ss-ij.
	Tincturæ Jaborandi	-	-	-	℥j.-iij.

(3) Darier orders:—

R	Naphthol-β	-	-	-	gr. iss.
	Hydrargyri Perchloridi	-	-	-	gr. iij.
	Resorcini.				
	Ammonii Chloridi.				
	Chloralis Hydratis	-	-	ana	gr. viij.
	Spiritus Lavandulæ	-	-	-	℥iijss.

Misce. Fiat lotio.

(4) R	Pilocarpinæ Hydrochloridi	-	-	-	gr. viij.
	"Rum."				
	Spiritus Camphoræ	-	-	ana	℥iiss.
	Glycerini	-	-	-	℥j.
	Alcohol (80°)	-	-	ad	℥iij.

Brocq adds to this:—

	Tincturæ Cantharadis	-	-	-	℥i.
	Olei Santali.				
	Olei Gaultheriæ	-	-	ana	℥iv.
(5) R	Liquoris Ammonia	-	-	-	℥i.
	Olei Terebenthinæ	-	-	-	℥ss.
	Spiritus Camphoræ	-	-	ad	℥iv.

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potash soap, chrysarobin ointment (7 to 10 per cent.).

The skin of the scalp must be subjected to the alterative effect of ointments, lotions, or powders containing sulphur from 5 to 10 per cent. The application is kept on all night.

R Balsami Peruviani.

Acidi Salicylici.

Resorcini - - - - - ana gr. xv.-xxx.

Sulphuris præcipitati - - - - - ʒi.-iiss.

Adipis lanæ hydrosi - - - - - ad ʒiv.

Misce. Fiat unguentum.

To this may be added coal tar (ʒiiss), tincture of cantharides (℥xv.), or hydrochloride of quinine and of pilocarpine (gr. xv. of each);

Or R Camphoræ - - - - - gr. xv.

Hydrargyri Subsulphatis - - - - - gr. xxx.

Adipis - - - - - ʒi.

Misce. Fiat unguentum.

In the morning, the layer of ointment is removed with a swab soaked in Hofmann's liquid, and an application of the stimulating lotion is then made.

Jacquet insists on the importance of local massage. High frequency effluvia may be used and exceptionally Finsen light, or even X-rays (2 H. of soft rays).

The local treatment must be varied, for the patient soon becomes tolerant.—(*Journ. de Méd. et de Chir. prat.*, December 10, 1916.)

TREATMENT OF TENO-SYNOVITIS.

Cohn states that this lesion is common, as the result of occupations like dressmaking, cutting, pressing, and working in sheet metal. The extensor tendons are more commonly affected than the flexor. If untreated, the lesion becomes chronic, and results in impaired movements and use. He recommends local treatment with—

R Tinctural Iodi - - - - - ʒi.

Unguenti Belladonnæ.

Unguenti Ichthyolis - - - - - ana ʒss.

Misce. Fiat unguentum.

(*New York Med. Journ.*, October 7, 1916.)

Gaucher recommends the addition to this of:—

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	Resorcini	-	-	-	℥iss.
	Chloralis Hydratis	-	-	-	℥ij.-vj.
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	Tincturæ Jaborandi	-	-	-	℥j.-ij.

(3) Darier orders:—

R	Naphthol-β	-	-	-	gr. iss.
	Hydrargyri Perchloridi	-	-	-	gr. ij.
	Resorcini.				
	Ammonii Chloridi.				
	Chloralis Hydratis	-	-	ana	gr. viij.
	Spiritus Lavandulæ	-	-	-	℥ijss.

Misce. Fiat lotio.

(4) R	Pilocarpinæ Hydrochloridi	-	-	-	gr. viij.
	"Rum."				
	Spiritus Camphoræ	-	-	ana	℥iiss.
	Glycerini	-	-	-	℥j.
	Alcohol (80°)	-	-	ad	℥ij.

Brocq adds to this:—

	Tincturæ Cantharadis	-	-	-	℥i.
	Olei Santali.				
	Olei Gaultieriae	-	-	ana	℥iv.

(5) R	Liquoris Ammoniaæ	-	-	-	℥i.
	Olei Terebenthinæ	-	-	-	℥ss.
	Spiritus Camphoræ	-	-	ad	℥iv.

Misce. Fiat lotio.

- (6) To a tumbler-ful of infusion of walnut leaves add from 1 to 3 tea-spoonfuls of ammonia and from 3 to 9 tea-spoonfuls of rum. To this may be added, at option, 3 tea-spoonfuls each of coal tar *saponiné* and spirits of camphor.

Counter-irritation.—When the state of the epidermis allows it, twice a week in the evening, or in the morning before applying the stimulating lotion, the scalp must be irritated. There are many ways of doing this: brushing with a hard brush or with a stiff-bristled T-brush; rubbing in with a hair glove a spirit lotion, or acetic acid 1 to 3, chloral hydrate 5, and ether 25; swabbing with tincture of iodine, pure, diluted with spirit or with the addition of from 5 to 10 per cent. of acetic acid; carbolic acid, tincture of iodine, and S.V.R. (60°) equal parts, diluted, if necessary, with 3 parts of spirit; 10 per cent. of lactic acid; irritant applications, blistering fluid,

Eighteen of the cases were females, and all were below the age of twenty; most had had defective home surroundings, and had associated early with bad companions. A strong element of sex was present in most cases, and many had been addicted to masturbation, while often the lying took the form of accusations of rape or self-charges of immorality. On the physical side, it is significant to note that six of the eighteen females suffered from gynaecological ailments, while others displayed Hutchinsonian teeth, "stigmata of degeneracy," and other abnormalities.

With a description of some border-line cases, the collection forms a useful and painstaking examination of a type familiar to students of abnormal psychology; but it is difficult to accept the view that these persons should be separated from the general class of the mentally infirm. Alienists and criminologists have long recognized that pathological conditions of the mind may produce disorders of conduct without impairment of intellect, and have termed the condition "moral insanity." The cases described in this book would all be included under such a term, and there seems no reason to make them into a separate class. The individual records are, however, of much interest and are well described.

The Cure of Obesity and the Obese Heart. By J. S. KELLETT SMITH, F.R.C.S. Pp. 90. London: J. and A. Churchill.

In this book the author sets before us the theory and practice of the Bergonié treatment of obesity, with illustrative cases. He is careful to note that restriction in diet is a necessary accompaniment to the electrical stimulation of the skeletal muscles in the treatment.

When referring to the troublesome symptoms of obesity and the relief of them by the Bergonié method, the author indulges in florid language, thus: "It is easy to understand the method of action of Passive Ergotherapy. The universal muscular contractions themselves lead to a better katabolism, whilst, at the same time, they squeeze out and thoroughly drain the stagnant pools and lymph spaces of the circulation. All the rubbish stored up in the quiet backwaters is thrown into the full current and the whole blood mass is swept freely through the liver, spleen, lungs, and other organs of purification and elimination."

In a combined treatment, it is difficult to allocate to each element its share in the result, and, where a formidable electrical installation is the potent factor, suggestion will take its part by inspiring confidence in the treatment and perseverance in following dietetic rules.

In the chapter on the obese heart, the author differentiates between fat around the heart and fatty infiltration of the muscle, and he rightly condemns the loose way in which the expression "fatty heart" is used.

It is all to the good that obesity should be treated on scientific lines under medical supervision, and on these grounds we welcome the book before us, which indicates how this can be done.

Reviews of Books.

The Diagnosis of Nervous Diseases. By PURVES STEWART, C.B., M.D., F.R.C.P. Fourth edition. Pp. 589. London: Edward Arnold. 15s. net.

THE fourth edition of this book has been considerably enlarged and new illustrations have been added. The work, which deals with the diagnosis of nervous disorders from their clinical aspect, has already become well known and appreciated in its former editions. In this volume, a new chapter has been added on the subject of "organic war lesions of the nervous system," in which are given descriptions of some wounds of the brain, spinal cord, and peripheral nerves that have come under the author's personal notice during his military service. The illustrations are very good.

Man: an Adaptive Mechanism. By GEORGE W. CRILE, F.A.C.S. Edited by ANNETTE AUSTIN. Pp. 387. New York: The Macmillan Company. 10s. 6d. net.

THIS book is the outcome of the author's experimental and clinical observations extending over a period of twenty years. In it an attempt is made to explain the occurrence of a large number of clinical phenomena and normal processes by reference to broad principles of biology, and to show the means by which man has become able to adapt himself to changing surroundings and to protect himself against harmful influences. Crile postulates the existence of a "kinetic system," which comprises the brain, adrenals, liver, thyroid, and muscles, and to this system is allotted the principal function of transferring potential into kinetic energy. To the overactivity of this system is ascribed the onset of many chronic diseases. The book is highly interesting throughout, and contains many suggestions of importance in connection with the causation and treatment of disease.

Pathological Lying, Accusation, and Swindling: a Study in Forensic Psychology. By WILLIAM HEALY, A.B., M.D., and MARY TENNEY HEALY, B.L. Pp. 286. London: William Heinemann. 10s. 6d. net.

THIS volume is one of a series of monographs published by the American Institute of Criminal Law and Criminology. The authors consider that the present use of the term "pathological lying" to include cases of epilepsy, insanity, and mental defect is a mistake, and they urge the recognition of a distinct species of pathological liar, whose falsifications are entirely disproportionate to any discernible end, but who cannot be definitely declared insane, feeble-minded, or epileptic. In support of their view, the authors give a careful account of nineteen pathological liars with details of their parentage, home conditions, history, habits, and delinquencies.

Eighteen of the cases were females, and all were below the age of twenty; most had had defective home surroundings, and had associated early with bad companions. A strong element of sex was present in most cases, and many had been addicted to masturbation, while often the lying took the form of accusations of rape or self-charges of immorality. On the physical side, it is significant to note that six of the eighteen females suffered from gynæcological ailments, while others displayed Hutchinsonian teeth, "stigmata of degeneracy," and other abnormalities.

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foods, the authors' position is so eminently sound that we may be permitted to quote some of their remarks. "It is a self-evident proposition," they say, "that the people who buy the foods have to pay for the manufacture and advertising of the food as well as a profit to the manufacturer and various middlemen, neither the manufacturer nor the middlemen being in business 'for their health.' This expense is unnecessary, because modifications of milk containing everything which is in these proprietary foods can be readily prepared from simple materials in the home." There follow some caustic remarks on some of the more-advertised varieties which we should like to produce here, if it would not prolong this review too much; it must suffice to endorse the authors' obvious opinion that there is no proprietary food which should, under any circumstances, be employed by a physician who knows his business. The majority are not what they profess to be—that is, adequate foods for infants; and, where they are so, they are expensive and inferior substitutes for cow's milk properly modified.

The remaining section deals with rickets and scurvy, and, in the account of the former, we are inclined to think that the authors have given somewhat short measure. However, the book is, on the whole, the wisest and sanest treatment of the subject which it has been our fortune to meet with, and is certainly the best for the student of children's feeding.

The Diagnosis and Treatment of Heart Disease. By E. M. BROCKBANK, M.D., F.R.C.P. Second edition. Pp. viii + 120. Crown 8vo. 3s. 6d. net.

IN this book the author has, as far as possible, succeeded in presenting the chief points of modern cardiology in a small space. The study of heart disease in the light of recent investigations is of so extensive a nature that the student, loaded as he is with so many subjects and so little time in which to comprehend them, may be excused if, on the eve of his examination, he turns with gratitude to a *résumé* such as the one before us.

We note with pleasure the author's remarks on percussion (p. 25), in which he emphasizes the value of "light percussion." They may be read with advantage by not a few teachers.

The attempt to convey to the mind the character and significance of cardiac murmurs by diagrams is laudable as far as it goes, but the reader must not be beguiled into the idea that they can be mastered by the study of the excellent views here given without extended clinical work.

The chapter of only ten pages on treatment cannot be seriously intended for reference in actual practice.

With the reservations given, we recommend the book to the student to assist him in gaining a general idea of the subject before he actually examines patients in the wards and O.P. room; he will also find it useful for refreshing his memory before his examination. To the practitioner, the book will be disappointing.

Preparations, Inventions, Etc.

DOSURINE URINE-TESTING OUTFIT.

(London: The Anglo-French Drug Co., Gamage Buildings, E.C.)

The "Dosurine" pocket-cases, of which there are three sorts, are intended to make possible a rapid analysis of urine, and an accurate quantitative estimate of any albumen or sugar present. The "Index" case contains materials for determining the presence of albumen and sugar; the "A" case and the "D" case are for the quantitative estimation of albumen and sugar respectively.

Each case contains a couple of test-tubes, a drop-measure, and the special re-agents, which are put up ready for use in exact quantities in hermetically sealed ampoules, thus obviating the necessity for measuring out the amounts required. Pocket-case "A" contains as well an albuminometer with a scale for reading off the amount of albumen precipitated by the re-agent.

We have had a set of these cases under observation for some time past, and have found them very handy and convenient, as well as extremely simple in manipulation. They are not at all bulky or heavy, and take up very little room in a bag or even a pocket. The results obtained by the re-agents provided stand comparison with more elaborate methods very well indeed.

"SOLOID" NASO-PHARYNGEAL (EUCAINE) COMPOUND,

(London: Messrs. Burroughs Wellcome & Co., Snow Hill Blds. E.C.)

This new product is of the same composition as the "Soloid" Naso-pharyngeal Compound, with the exception that eucaine hydrochloride is introduced in place of a corresponding equivalent of the cocaine salt. The formula is:—

R	Sodii Chloridi	-	-	-	gr. vij (0.454 gm.).
	Boracis	-	-	-	gr. iiss (0.162 gm.).
	Acidi Borici	-	-	-	gr. $\frac{3}{4}$ (0.049 gm.).
	Sodii Benzoatis	-	-	-	gr. ss (0.032 gm.).
	Mentholis	-	-	-	gr. $\frac{1}{80}$ (0.0013 gm.).
	Thymolis	-	-	-	gr. $\frac{1}{160}$ (0.00065 gm.).
	Eucain, Hydrochloridi	-	-	-	gr. $\frac{1}{2}$ (0.011 gm.).
	Olei Gaultheriæ	-	-	-	℥ $\frac{1}{20}$ (0.003 c.c.).

When powdered and dissolved in from one to three ounces of water, the solution forms an excellent gargle or spray for irritable conditions of the nose and throat. A solution of two soloids in ten ounces of water has been used with success as a lotion in conjunctivitis.

The soloids are issued in bottles of 25 and 100.

foods, the authors' position is so eminently sound that we may be permitted to quote some of their remarks. "It is a self-evident proposition," they say, "that the people who buy the foods have to pay for the manufacture and advertising of the food as well as a profit to the manufacturer and various middlemen, neither the manufacturer nor the middlemen being in business 'for their health.' This expense is unnecessary, because modifications of milk containing everything which is in these proprietary foods can be readily prepared from simple materials in the home." There follow some caustic remarks on some of the more-advertised varieties which we should like to produce here, if it would not prolong this review too much; it must suffice to endorse the authors' obvious opinion that there is no proprietary food which should, under any circumstances, be employed by a physician who knows his business. The majority are not what they profess to be—that is, adequate foods for infants; and, where they are so, they are expensive and inferior substitutes for cow's milk properly modified.

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"PULVERETTE ACETOSAL."

(London: Messrs. Oppenheimer, 179, Queen Victoria St., E.C.)

Acetosal is the name given to a specially purified, re-crystallized form of acetylsalicylic acid, the acetic ester of salicylic acid. It contains no free salicylic acid, and may be used for all purposes for which salicylic acid or the salicylates are indicated. It possesses all the therapeutic advantages of salicylic acid and the salicylates without their disadvantages. It does not upset the stomach, for it passes through unchanged to be decomposed readily in the alkaline fluids of the intestine, in which salicylic acid is gradually liberated and absorbed. Its slower elimination prolongs the therapeutic effect, but does not produce the depressant and toxic symptoms frequently associated with sodium salicylate.

The "pulverette" consists of the powder enclosed in a thin coating like an egg-shell, which cracks easily when pressed between the finger and thumb, liberating the powder. When swallowed, the coating is quickly dissolved, setting free the powder, which is unaffected by the acid contents of the stomach, and passes into the intestine under the best conditions for absorption.

The pulverettes are made in flat, oval, and round shapes, and are supplied in bottles of 100 and 1,000.

STERILIZED INJECTIONS OF SCOPOLAMINE AND MORPHINE.

(London: The Anglo-French Drug Co., Gamage Buildings, E.C.)

Preparations of these two drugs are put up in hermetically sealed ampoules in four different doses. The compound of scopolamine used is the hydrobromide in doses of $\frac{1}{4}$ m.g. (gr. $\frac{1}{360}$) and $\frac{1}{2}$ m.g. (gr. $\frac{1}{180}$). The combination of morphine and scopolamine is also put up in two doses, one containing 1 c.g. (gr. $\frac{1}{60}$) of morphine and $\frac{1}{4}$ m.g. (gr. $\frac{1}{360}$) of scopolamine, and the other 1 c.g. of morphine and 1 m.g. (gr. $\frac{1}{60}$) of scopolamine. They are issued in boxes containing one dozen ampoules.

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This new preparation of paraffin was made at the request of a physician who wished to have a laxative for use by delicate patients. For this purpose it was necessary that the preparation should be free from any griping effect, gentle in action, producing a natural motion, without any constipating after-effect, and not requiring increased doses with continued use. The purest medicinal liquid paraffin was used as a basis, and emulsified with pure extract of malt and the finest honey. It was found possible to combine in this way 75 per cent. of liquid paraffin in the preparation. This has a pleasant odour and an agreeable flavour, and can be taken and digested easily without causing any eructations or nausea. It has been found of the utmost use in the constipation of pregnancy, of delicate patients after operations, or of children. It is put up and issued in specially prepared containers of half-a-pound.

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AND

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Morphine 1 cg. Scopolamine $\frac{1}{2}$ mg. Box of
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12 1 cc. ampoules 4/6

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Extract from Proceedings of the Royal Society of Medicine, February, 1913:—

Dr. GEORGE HERSCHELL, comparing electric and chemical colloid copper, stated: "Chemical colloid appears to give the best results. In the following cases chemically prepared colloid was used. Experimentally it has been proved: (1) That particles of colloid copper can be demonstrated in the granulations of cancerous growths after two or three injections of the colloid; and clinically (2) There is invariably great relief from pain; (3) Appetite and strength return and the patient puts on flesh; (4) There is in many cases a diminution in the size of the tumour; (5) The injections are absolutely non-toxic, although in many cases an inflammatory reaction is manifested in the cancerous growths.

"As regards my own personal experience in the use of this method of treatment in addition to my own cases, I have had an opportunity of observing the effects in the practice of some of my medical friends, and in nearly all cases the progress of the disease appeared to be arrested."

CUPRASE is put up in boxes containing 8 ampoules of 5 c.c. each.

APPOINTMENTS.

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ALCOCK, ARNOLD, M.D. Lond., appointed Honorary Surgeon to the Gloucestershire Royal Infirmary and Eye Institution.

BOWER, H. E., M.D., C.M. Edin., appointed Medical Officer of Health to the Runcorn Rural District Council.

CORDINGLEY, GRACE, L.S.A., appointed Pathologist to the Venereal Diseases Department, Royal Free Hospital.

GRESSY, C. J., L.R.C.P. Lond., M.R.C.S., appointed Certifying Surgeon under the Factory and Workshops Acts for Ringwood (Hants.)

CULLEN, J. R. F., M.B., C.M. Glasg., appointed Certifying Factory Surgeon for the Alexandria District, co. Dumbarton.

DINNICK, O. T., M.R.C.S., L.R.C.P. Lond., appointed Senior Assistant to the Venereal Diseases Department, Royal Free Hospital.

DOW, T., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg., appointed District Medical Officer of the Teignmouth Union.

DUNDAS, GRACE H. G., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg., F.R.C.S.I., appointed Medical Officer under the Child-Welfare Scheme of the Leith Town Council.

ENGINEER, SORAB H., M.R.C.P.E., appointed Honorary Physician to Sir J. J. Hospital, Bombay.

GEOGHEGAN, A. Y., M.D. Dub., appointed District Medical Officer of the Risbridge Union.

GORDON, F. J., M.R.C.S., L.R.C.P. Lond., appointed District and Workhouse Medical Officer of the Horncastle Union.

GREEN, EDITH M. N., M.B., B.S. Lond., appointed Senior Assistant to the Venereal Diseases Department, Royal Free Hospital.

GUY'S HOSPITAL.—The following appointments have been made in connexion with the scheme for the diagnosis and treatment of venereal disease: Assistant to the Obstetric Surgeons, Miss **MORNA RAWLINS, M.B., B.S. Lond.,** Assistant to the Dermatologist, Mr. **L. S. GATHERGOOD, M.R.C.S., L.R.C.P.,** Assistant to the Genito-Urinary Surgeon, Captain **G. E. GENGE-ANDREWS, M.B., B.S. Lond.,** Assistant Bacteriologist, Miss **UNA GRIFFIN, M.B., B.S. Lond.**

HANDLEY, W. SAMPSON, M.D., H.S. Lond., F.R.C.S. Eng., appointed Surgeon to the Middlesex Hospital.

HOULBROOK, W. E., M.R.C.S. L.R.C.P. Lond., appointed Certifying Factory Surgeon for the Hathersage District, co. Derby.

JONES, E. LLOYD, M.D., B.C. Camb., appointed Demonstrator of Medicine at Cambridge University.

MACKARELL, W. W., M.D. Liverp., appointed Pathologist to the Royal Infirmary, Leicester.

MALCOLM, R., M.D., appointed District Medical Officer of the Doncaster Union.

MCGOWAN, THOMAS, appointed Temporary Medical Officer of Bridewell Dispensary District of the Athlone Guardians.

NICHOLL, R. C., L.R.C.P. & S. Irel., appointed District Medical Officer of the Fylde Union.

ORCHARD, W. G., M.R.C.S., L.R.C.P. Lond., appointed District Medical Officer of the Hailsham Union.

ROBERTSON, Miss E. A., M.B., appointed Assistant Medical Officer of the Hackney Union Infirmary.

SIMPSON, H., M.B., B.C. Camb., appointed District Medical Officer of the Tonbridge Union.

SLATTERY, J. B., M.D., appointed District Medical Officer of the Saffron Walden Union.

STATHAM, R. W., M.R.C.S. Eng., appointed Medical Officer of the Cheddar Cottage Home of the Axbridge Union.

THOMSON, W. H., M.D. Glasg., appointed Medical Officer of Health for Herts.

TOCKER, J., M.B., C.M., appointed Medical Officer for the Morthoe District by the Barnstaple (Devon) Board of Guardians.

VILYANDRE, GEORGE, M.R.C.S., L.R.C.P., Captain R.A.M.C., appointed War Office Radiographer to the Guildford War Hospital.

WHEELER, W. I. DE COURCY, F.R.C.S. Irel., appointed one of the Medical Referees under the Workmen's Compensation Act, 1906, for the County and City of Dublin.

WHITESIDE, W. C., M.B., Ch.B. Edin., appointed District Medical Officer of the Tamworth Union.

WIGHTWICK, ALFRED, M.B., Ch.B. Vinct., appointed Honorary Anaesthetist to the Torbay Hospital, Torquay.

WINTLE, COLSTON, L.R.C.P., M.R.C.S., J.P., re-appointed Chairman of the Health Committee of the Bristol City Council.

RELIABLE DIABETIC FOODS

STARCHLESS AND PALATABLE.

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14, HENRIETTA STREET,
COVENT GARDEN,
LONDON.

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GORDON, F. J., M.R.C.S., L.R.C.P. Lond., appointed District and Workhouse Medical Officer of the Horncastle Union.

GREEN, EDITH M. N., M.B., B.S. Lond., appointed Senior Assistant to the Venereal Diseases Department, Royal Free Hospital.

GUY'S HOSPITAL.—The following appointments have been made in connexion with the scheme for the diagnosis and treatment of venereal disease: Assistant to the Obstetric Surgeons, **Miss MORNA RAWLINS, M.B., B.S. Lond.**; Assistant to the Dermatologist, **Mr. L. S. GATHERGOOD, M.R.C.S., L.R.C.P.**; Assistant to the Genito-Urinary Surgeon, **Captain G. E. GENGEL-ANDREWS, M.B., B.S. Lond.**; Assistant Bacteriologist, **Miss UNA GRIFFIN, M.B., B.S. Lond.**

HANDLEY, W. SAMPSON, M.D., M.S. Lond., F.R.C.S. Eng., appointed Surgeon to the Middlesex Hospital.

HOULBROOK, W. E., M.R.C.S. L.R.C.P. Lond., appointed Certifying Factory Surgeon for the Hathersage District, co. Derby.

JONES, E. LLOYD, M.D., B.C. Camb., appointed Demonstrator of Medicine at Cambridge University.

MACHARELL, W. W., M.D. Liverp., appointed Pathologist to the Royal Infirmary, Leicester.

MALCOLM, R., M.D., appointed District Medical Officer of the Doncaster Union.

MCGOWAN, THOMAS, appointed Temporary Medical Officer of Bridewell Dispensary District of the Athlone Guardians.

NICHOLL, R. O., L.R.C.P. & S. Irel., appointed District Medical Officer of the Fyde Union.

ORCHARD, W. G., M.R.C.S., L.R.C.P. Lond., appointed District Medical Officer of the Hailsham Union.

ROBERTSON, Miss E. A., M.B., appointed Assistant Medical Officer of the Hackney Union Infirmary.

SIMPSON, H., M.B., B.C. Camb., appointed District Medical Officer of the Tonbridge Union.

SLATTERY, J. B., M.D., appointed District Medical Officer of the Saffron Walden Union.

STATHAM, R. W., M.R.C.S. Eng., appointed Medical Officer of the Cheddar Cottage Home of the Axbridge Union.

THOMSON, W. H., M.D. Glasg., appointed Medical Officer of Health for Herts.

TOCKER, J., M.B., C.M., appointed Medical Officer for the Morthoe District by the Barnstaple (Devon) Board of Guardians.

VILVANDRE, GEORGE, M.R.C.S., L.R.C.P., Captain R.A.M.C., appointed War Office Radiographer to the Guildford War Hospital.

WHEELER, W. I. DE COURCY, F.R.C.S. Irel., appointed one of the Medical Referees under the Workmen's Compensation Act, 1906, for the County and City of Dublin.

WHITESIDE, W. C., M.B., Ch.B. Edin., appointed District Medical Officer of the Tamworth Union.

WIGHTWICK, ALFRED, M.B., Ch.B. Vict., appointed Honorary Anaesthetist to the Torbay Hospital, Torquay.

WINTLE, COLSTON, L.R.C.P., M.R.C.S., J.P., re-appointed Chairman of the Health Committee of the Bristol City Council.

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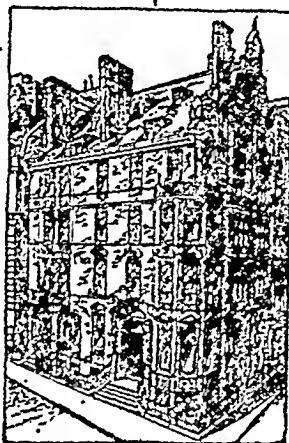
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"Wellcome" Adrenalin — Burroughs Wellcome & Co.	xxix

SANATORIA (OPEN-AIR TREATMENT):—

Rosetree Sanatorium	x
Wensleydale Sanatorium	x

SURGICAL AND MEDICAL APPLIANCES, &c.:—

Artificial Limbs — F. O. Ernst	xi
Curtis Abdominal Support — Walton & Curtis	viii
Galyl Pocket Outfit — Anglo-French Drug Co.	i
Hoeftche's Extension Apparatus — C. A. Hoeftche	xxviii
"Gaiwanoset" — Medical Supply Association	ix
Salmon Ody Trusses — Salmon Ody, Ltd.	xi
Sterilization of Wounds — Carrel's Apparatus — Down Bros., Ltd.	xxiv
Surgical Appliances — F. G. Ernst	xi

TONIC WINES:—

Hall's Wine	xix
Junora	xv
Wincarnis	xxvii

TRUSSES:—

Salmon Ody, Ltd.	xi
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WHISKY:—

G.H. Diabetes Whisky — Humphrey, Taylor & Co., Ltd.	xv
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LONDON COUNTY & WESTMINSTER BANK,

(ESTABLISHED IN 1836.) LIMITED.

HEAD OFFICE: 41, LOTHBURY, E.C.

CAPITAL £14,000,000. IN 700,000 SHARES OF £20 EACH.

PAID-UP CAPITAL - £3,500,000.

RESERVE - £4,000,000.

The Rt. Hon. The Viscount Goschen, Chairman.
WALTER LEAF, Esq., Deputy-Chairman.Joint General Managers { F. J. BARTHORPE.
J. W. BUCKHURST.

Secretary: A. A. KEMPE.

BALANCE SHEET, 30th DECEMBER, 1916.

LIABILITIES.			ASSETS.		
	£	s. d.		£	s. d.
CAPITAL—Subscribed..	£14,000,000		CASH—		
700,000 Shares of £20 each, £5 paid ..	3,500,000	0 0	In hand and at Bank of England..	32,383,399	18 6
RESERVE ..	4,000,000	0 0	Money at Call and Short Notice ..	2,871,420	4 9
CURRENT AND DEPOSIT ACCOUNTS	117,269,704	3 8	BILLS DISCOUNTED		
CIRCULAR NOTES, LETTERS OF CREDIT, COMMISSION LOANS, AND OTHER ACCOUNTS, including provision for Contingencies ..	2,985,403	8 9	INVESTMENTS—		
ACCEPTANCES FOR CUSTOMERS AND OBLIGATIONS under Treasury Minute of 27th May, 1916 ..	6,545,297	16 6	Consols and 4½ per cent. War Loan (of which £2,650,376 is lodged for Public Accounts, and under Treasury Minute of 27th May, 1916, and other Securities of, or guaranteed by, the British Government ..	32,382,681	7 0
ENDORSEMENTS ON BILLS NEGOTIATED ..	433,365	0 0	Indian Government Stock, and Indian Government Guaranteed Railway Stocks and Debentures ..	832,477	18 11
REBATE ON BILLS not due ..	112,550	0 10	Colonial Government Securities, British Corporation Stocks, and British Railway Debenture Stocks ..	1,032,360	9 0
PROFIT AND LOSS BALANCE, as below	497,291	3 0	Other Investments ..	1,807,534	0 2
				35,745,053	15 1
			LONDON COUNTY & WESTMINSTER BANK (PARIS) LIMITED—		
			4,000 £20 Shares fully paid ..	200,000	0 0
			15,000 £20 Shares £7 10s. paid ..		
			ADVANCES TO CUSTOMERS AND OTHER ACCOUNTS (including promissory notes, Stock Exchange Loans) ..	36,117,330	5 0
			LIABILITY OF CUSTOMERS FOR ACCEPTANCES, &c., as per contra ..	6,545,297	16 6
			BILLS NEGOTIATED, as per contra ..	433,365	0 0
			BANK AND OTHER PREMISES (at cost, less amounts written off) ..	1,709,303	17 4
				£135,343,634	12 9
	£135,343,634	12 9			

* War Loan has been taken at cost and all other investments at or under market prices on 30th December, 1916.

Dr.			PROFIT AND LOSS ACCOUNT.			Cr.		
	£	s. d.		£	s. d.		£	s. d.
To interest paid to Customers ..	2,173,583	16 5	By Balance brought forward from 31st December, 1915 ..	161,534	19 0			
Salaries and all other expenses, including Income Tax and Auditors' and Directors' Remuneration ..	1,684,223	8 11	Gross Profit for the year, after making provision for Bad Debts and Contingencies, and including Rebate brought forward from 31st December last ..	5,040,083	10 2			
Rebate on Bills not due carried to New Account ..	112,550	0 10						
Interim Dividend of 9 per cent. paid in August last ..	315,000	0 0						
Provision for Depreciation of Investments ..	319,000	0 0						
Bank Premises Account ..	100,000	0 0						
Further Dividend of 9 per cent., payable 1st February next (making 18 per cent. for the year) ..	£315,000	0 0						
Balance carried forward ..	182,291	3 0						
	497,291	3 0						
	£5,201,648	9 2					£5,201,648	0 2

GOSCHEN,
WALTER LEAF, Directors.
O. A. DENECKE,)

F. J. BARTHORPE, Joint General
J. W. BUCKHURST, Managers.
A. G. PIKE, Chief Accountant.

AUDITORS' REPORT.

We have examined the above Balance Sheet and compared it with the Books at Lothbury and Lombard Street, and the Certified Returns received from the Branches.

We have verified the Cash in hand at Lothbury and Lombard Street and at the Bank of England, and the Bills Discounted, and examined the Securities held against Money at Call and Short Notice, and those representing the Investments of the Bank.

We have obtained all the information and explanations we have required, and in our opinion the Balance Sheet is properly drawn up so as to exhibit a true and correct view of the state of the Company's affairs according to the best of our information and the explanations given to us, and as shown by the Books of the Company.

LONDON, 15th January, 1917.

FRED. JOHN YOUNG, F.C.A.,
G. E. SENDELL, F.C.A., Auditors.

Squire's Organo-Therapeutic Preps.

ELIX. HYPOPHYSIS CEREB.

(SQUIRE).

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(ESTABLISHED IN 1836.) **LIMITED.**

(ESTABLISHED IN 1836.)

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J. W. BUCKENHURST.

Secretary: A. A. KEMPE.

BALANCE SHEET, 30th DECEMBER, 1916.

LIABILITIES.			ASSETS.		
	£	s. d.	CASH—	£	s. d.
CAPITAL—Subscribed..	<u>£14,000,000</u>		In hand and at Bank		
700,000 Shares of £20 each, £5 paid ..	3,500,000	0 0	of England..	32,385,399	15 6
RESERVE	4,000,000	0 0	Money at Call and		
CURRENT AND DEPOSIT ACCOUNTS	117,289,704	3 8	Short Notice ..	7,871,420	4 9
CIRCULAR NOTES, LETTERS OF CREDIT, COMMISSION LOANS, AND OTHER ACCOUNTS, including provision for Contingencies ..	2,985,408	8 9	BILLS DISCOUNTED		40,258,820
ACCEPTANCES FOR CUSTOMERS AND OBLIGATIONS under Treasury Minute of 27th May, 1916	6,545,297	16 6	"INVESTMENTS—		14,338,443
ENDORSEMENTS ON BILLS NEGOTIATED	433,365	0 0	Consols and 4 per cent. War Loan (in which £2,850,716 is lodged for Public Accounts, and under Treasury Minute of 27th May, 1916), and other Securities of, or guaranteed by, the British Government ..	32,382,681	7 0
REBATE ON BILLS not due	112,550	0 10	Indian Government Stock, and Indian Government Guaranteed Railway Stocks and Debentures	882,477	18 11
PROFIT AND LOSS BALANCE, as below	497,291	3 0	Colonial Government Securities, British Corporation Stocks, and British Railway Debenture Stocks	1,002,360	9 0
			Other Investments..	1,597,534	0 2
			LONDON COUNTY & WESTMINSTER BANK (PARIS) LIMITED—		
			4,000 £20 Shares fully paid)		
			15,000 £20 Shares £7 10s. paid)	200,000	0 0
* War Loan has been taken at cost and all other investments at or under market prices on 31st December, 1916.			ADVANCES TO CUSTOMERS AND OTHER ACCOUNTS (including pre-mortuarium Stock Exchange Loans)	36,117,330	.5 0
			LIABILITY OF CUSTOMERS FOR ACCEPTANCES, &c., as per contra ..	6,545,297	16 6
			BILLS NEGOTIATED, as per contra ..	433,365	0 0
			BANK AND OTHER PREMISES (at cost, less amounts written off)	1,709,303	17 4
	<u>£135,343,634</u>	12 9		<u>£135,343,634</u>	12 9

Dr.		PROFIT AND LOSS ACCOUNT.		Cr.	
	£	s.	d.		£
To interest paid to Customers	2,173,563	16	5	By Balance brought forward from 31st December, 1915	181,524 19 0
" Salaries and all other expenses, including Income Tax and Auditors' and Directors' Remuneration ..	1,684,223	6	11	" Gross Profit for the year, after making provision for Bad Debts and Contingencies, and including Rebate brought forward from 31st December last	5,040,083 10 2
" Rebate on Bills not due earned to New Account	112,550	0	10		
" Interim Dividend of 9 per cent. paid in August last	315,000	0	0		
" Provision for Depreciation of Investments	319,000	0	0		
" Bank Premises Account	100,000	0	0		
" Further Dividend of 9 per cent., payable 1st February next (making 18 per cent. for the year) £315,000 0 0					
" Balance carried forward 182,291 3 0					
	497,291	3	0		
	£5,201,648	9	2		£5,201,646 9 2

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WALTER LEAF, } *Directors.*
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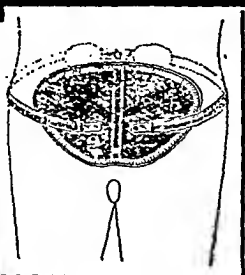
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FRED. JOHN YOUNG, F.C.A.,
G. E. SEDELL, F.C.A., } Auditors.

LONDON, 15th January, 1917.

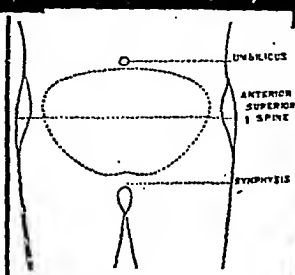
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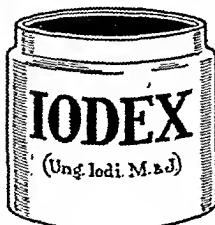
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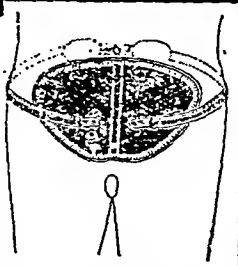
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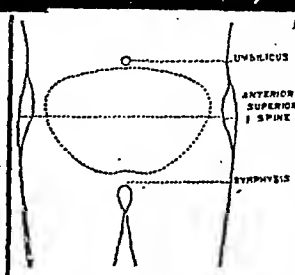
The CURTIS ABDOMINAL SUPPORT

PATENTED 2103/10



TO THE SURGEON

In cases of Abdominal Section and for Abdominal Wounds this is the ideal support.



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DOSES: 0·20—0·30—0·40.

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AMPOULES B " 20 cg. in 1 c.c.

PILLS " 10 cg.

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Mercurial salt of HECTINE, a combined arsenico-mercurial treatment of Syphilis, especially recommended after a course of Galyt.

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Hg. .. 1 cg. in 1 c.c.

AMPOULES B containing:
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Hg. .. 1½ cg. in 1 c.c.

PILLS containing:
Hectine .. 10 cg.
Protoiod of Hg. 1 cg.
Opium Extract 1 cg.

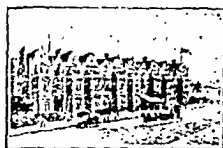
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A HOUSE licensed for the reception of a limited number of ladies of unsound mind. Both certified and voluntary patients received. This is a large country house with beautiful grounds and park, 5 miles from Sheffield Station, Grange Lane, G.C. Railway, Sheffield. Telephone No. 34 Rotherham.

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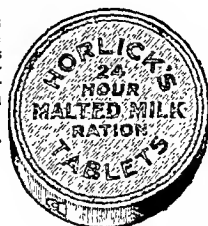
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The Liquid Paraffin in this combination is of the correct viscosity and specific gravity for internal use. It answers in letter and spirit all the B.P. requirements.

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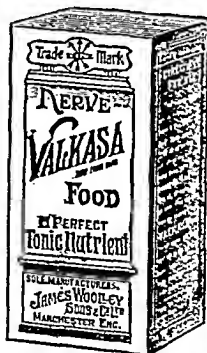
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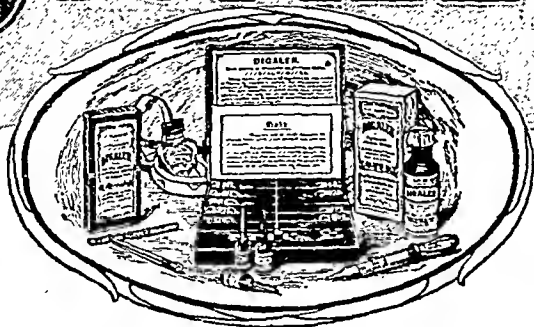
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While the action of reversible colloids in preventing irreversible colloids from coagulation has been understood only in recent years, it has long been known that certain substances prevent the casein of milk—an irreversible colloid—from coagulating in large, thick curds when used for infant feeding.

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HUMAN MILK (Proteid, 2 per cent.).

Casein- : - 0.6 per cent.

Milk-albumin - 1.4 " "

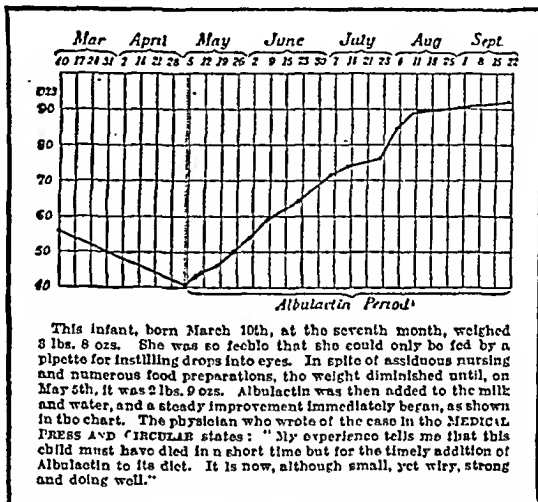
COW'S MILK (Proteid, 4 per cent.).

Casein- - - 3.25 per cent.

Milk-albumin - 0.75 " "

When the cow's milk is diluted to make the total proteids agree in quantity, the child gets 1.6 per cent. of casein, and only 0.37 per cent. of milk-albumin, or nearly three times more casein than it ought, and only a quarter of the milk-albumin.

If the milk is further reduced to make the casein proportion correct, the milk-



albumin is reduced to about one-tenth of what it ought to be.

The solution of the infant feeding problem, therefore, resolves itself logically into the addition of sufficient milk-albumin to supply the necessary protective colloid and to furnish enough easily-digested proteid.

This is admittedly now done in the best and simplest way by the addition of Albulactin. On this subject a physician has written in *The Lancet*: "The method of milk modification by means of Albulactin is preferable to and more reliable than the use of citrated milk, peptonised milk, cream and whey feeding, and all other plans which have been adopted to meet the frailty of infantile digestion."

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After professional skill has succeeded in carrying the patient over the crisis of a serious illness, the regular use of "WINCARNIS" will promote a speedy convalescence and a rapid return to health.

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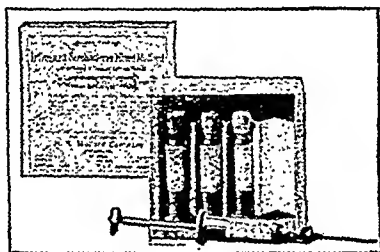
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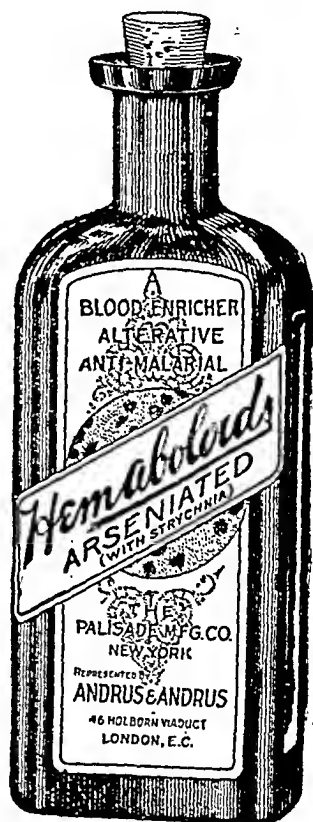
Tr. Ferri Chlor.	-	20 Minims
Arsenious Acid	-	1/40 Grain
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Indicated in the severest forms of Anemia, especially that of Chronic Malarial Poisoning, Cachexiae, Malignant Disease, Sepsis, Chorea, Chronic Rheumatism, Obstinate Neuralgias, after Operation, Protracted Convalescence, etc.

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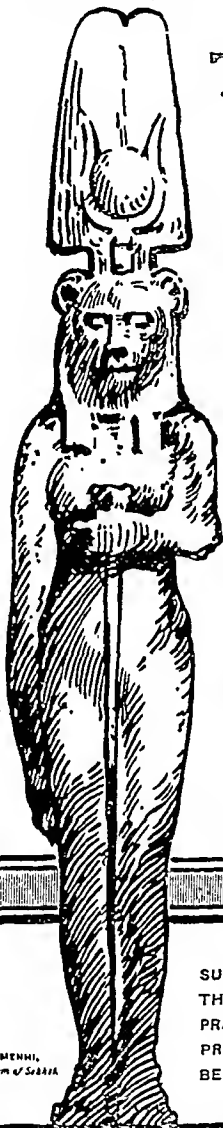
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PREPARED COW'S MILK FOR INFANTS.

THOSE who think all artificial foods should be condemned are those who have seen ample evidence from their use and abuse.

But it does not follow from their wrong use all artificial foods are bad or wrong in principle.

When a baby is deprived of breast milk, either cow's milk or an artificial food is necessary to tide over the first nine months, and from time immemorial cow's milk has been the chief agent.

Unfortunately stale, contaminated cow's milk and milk-borne diseases (diphtheria, typhoid and scarlet fever, tuberculosis, etc.) are an ever-present risk.

The preventive is to use Glaxo, which is milk, pure milk, sweet milk, and nothing but the solids of milk. This milk is dried to a powder and made germ-free at the source of supply before any chemical change has had time to take place.

The Glaxo process alters the physical character of the curd preventing it subsequently forming a dense leathery mass.

Glaxo comes to the home in a sealed tin, free from the risk of contamination.

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"Solurool" is harmless, being non-toxic and non-depressant.

"Solurool" in tablet form is administered with advantage in Gout (acute and chronic), Gravel and Obesity.

"Solurool" has proved valuable by intra-muscular injection in Neuritis, Sciatica and Lumbago.

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4 grs. in each.

Dose: One or two tablets, thrice daily.

Trade Marks

2 grs. in each; also with $\frac{1}{2}$ gr. Novocain.

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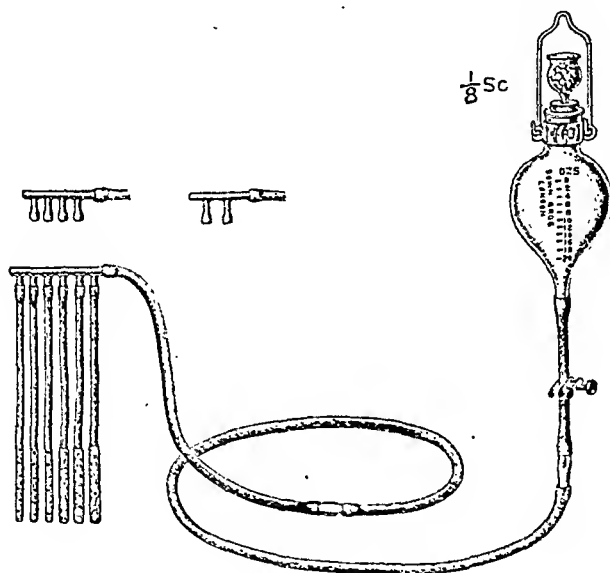
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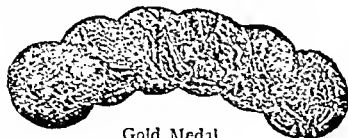


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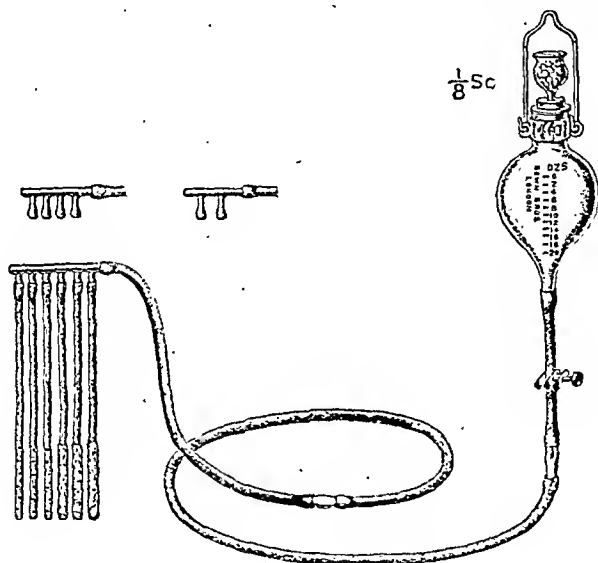
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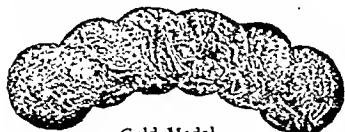


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THE PRACTITIONER.

MARCH, 1917.

DREAMS AND THEIR INTERPRETATION.

BY SIR ROBERT ARMSTRONG-JONES, M.D., F.R.C.P., F.R.C.S.

*Hon. Major, R.A.M.C.; Lecturer in Psychological Medicine to
St. Bartholomew's Hospital and Consulting Physician in
Mental Diseases to Military Forces in London;
late Resident Physician and Superintendent
of the London County Asylum, Claybury.*

It may seem out of place, whilst we are face to face with so grim a reality as a War for our very existence, a War which has so deeply affected the life of every individual in this country as well as within the Empire, that we should be discussing the realms of dreamland. But we may claim that the "Bowman" in the early days of the War laid particular emphasis upon dreams—for to these of our brave warriors appeared the "Angel of the Mons," and the "unconscious mind" has thus been drawn, in literature at any rate, into the tragedies of the War. Moreover, medical men and students are all familiar with facts within the range of physiological experience, and we know that their interest in mental problems has not prevented them from realizing hard facts.

In regard to mental diseases, there has been witnessed among our soldiers during this War a marked dissociation of the elements of the mind, and the influence of the emotions upon conduct has been more than confirmed. The attention has been engrossed, and the mind has acted automatically and unconsciously without the direction of the will. This unconscious element of the mind is an activity *with* us though not *of* us. Sir William Hamilton stated that consciousness cannot exist independently of some peculiar modification of mind, but some modification of mind (meaning the un-conscious) is possible without actual consciousness. This field of the unconscious mind is not, as is claimed for it, the recent discovery of Freudian psychologists. Consciously and "un-

HOEFFTCKE'S EXTENSION APPLIANCES.

AMBULATORY TREATMENT OF FRACTURE OF THE LIMBS; TUBERCULOUS AND ARTHRITIC DISEASE OF JOINTS.

By C. A. HOEFFTCKE, 21, Woodstock Street, Oxford Street, London, W.

J. A.—, male, æt. 55. Loading wood on board ship, crane swung round and set of timber fell on to tibia and fibula below knee, multiple comminuted fracture, 24 pieces, condyles of tibia and fibula involved (May 15th, 1916).

Patient removed to Guy's Hospital on ambulance, leg X rayed (see Fig. 1), prepared for anæsthetic, and following day taken to operating theatre. The limb was then one and a half inches short. Owing to this shortening and in consequence of the contracted soft tissues the leg was much enlarged at and below the knee-joint.

The senior surgeon, when seeing the X ray negative, decided not to plate the bones, but to order Hoefftcke's Extension appliance for this case. I saw the patient some days after, and on May 22nd took a cast of the limb, which was necessary to make my Extension splint.

The patient was then anæsthetised and the shortening reduced on my Extension table, the fragments falling nicely into line with a little manipulation. I then put the limb in plaster and maintained extension. Two weeks and two days later, June 8th, the plaster was cut off and Hoefftcke's Extension splint substituted. Patient stood up and walked a few paces along the ward the same day.

On June 12th the patient walked out in the hall, and on June 14th he was discharged from hospital as an out-patient. On June 16th a little movement in the knee was allowed.

From that time onwards the limb became stronger and more movement in the knee was obtained until, eight weeks after the splint was put on, the patient was allowed to leave the Extension appliance off at night. On Sept. 8th, 1916, the X rays (see Fig. 2) showed firm bony union, there was free movement with full flexion and extension of the knee-joint and no shortening. The splint was then left off for good.

This case shows clearly that the best result can be obtained in the shortest time with the ambulatory treatment in even the most hopeless case of fracture with the joint involved.

My Extension splint is now also extensively used for compound fractures produced by shot or shell, and the surgeons are very satisfied with the result obtained by its use. The upright position of the body and exercise of the joints whilst walking with a broken leg on my Extension splint improve the circulation, which combats sepsis and furthers the formation of callus.



Fig. 1.

May 15, 1916.
Multiple comminuted Fracture.
24 pieces.



Fig. 2.

September 8, 1916.
Fracture firmly united.
Full free movement in knee-joint.

viewed from the waking state have no less strange or perplexing a reality.

Dreams have been defined as "conscious processes during sleep," a definition which implies a self-contradiction, for conscious processes deny sleep, and normal sleep is attended with unconsciousness; but this unconsciousness may indeed be slight, yet it is not infrequently profound and even complete. During deep sleep the senses are unaffected by external and even by internal impressions, yet it has been asserted that the mind is never at rest during sleep, and that there is always some dreaming. Dreams have also been defined as thoughts, or a series of thoughts, experienced in sleep, *i.e.*, a train of ideas presenting themselves to the mind during sleep. To-day, the definition of a dream is "the symbol of an unfulfilled wish," the meaning of the symbol having to be interpreted by an assumed psycho-analytic "code," and because of its symbolic function a dream is looked upon to-day as having its root firmly fixed in the experience of the waking life, whilst its superstructure lies in the unreality of phantasms. It may help to understand the terms symbol and symbolism, if we state that they are only applicable when the dream is interpreted, *i.e.*, the dream then becomes the symbol of the meaning elicited. The terms themselves apply to the dream as recorded or the manifest dream, which is always centralized round certain subjects connected with the waking experience, and not, as erroneously believed by some, always and invariably connected with sexual matters.

The history of dreams is a long and ancient record, and authorities in the past, have offered many explanations as to the process and import of dreaming. The Old Testament describes many dreams, as well as their interpretation. We have the beautiful dream of Jacob's ladder, and that of Joseph, which he related to his brothers, the dream of Pharaoh and of Pharaoh's servants, of Solomon's choice of wisdom, through which he obtained in addition, riches and honour. The dream of Nebuchadnezzar, which, as frequently happens, he himself had forgotten, was, with Daniel's help, revealed and subsequently interpreted, often the quickest way then to royal favour, and in acknowledgment of which the "King made Daniel a great man." The influence of dreaming upon the conscience is shown by the dream of Job, when he

consciously," the feeling of all medical men has been how best to win the War, and the Director-General of the Army Medical Service has been supported in his work with unspeakable patriotism by the whole medical profession. There has been an unconscious feeling that life should be preserved, grief assuaged, and suffering relieved, and an analysis of this "unconscious" feeling has always been a favourite study among those who endeavour "to heal the mind." As an instrument in this analysis, the study of dreams has been regarded as one of the most powerful wherewith to unravel its mysteries. It is claimed that the interpretation of dreams may help to *bring out of the* "un-conscious mind" what is perplexing and hidden, and may thus help to restore the balance in the unstable and neurasthenic, who have suffered so extensively from mental shock of various kinds. The laboratory of the mind is open to all, but it must be especially attractive to students of mental conditions, who take more than an academic interest in the subject. We are, therefore, justified in seeking for explanations of facts, such as dreams, which are within the experience of all.

The subject of dreams has interested mankind since the earliest days of primitive culture, and long before the dawn of history. Many and varied have been the speculations in regard to them, and the philosophers of antiquity entertained great diversities of opinion as to their cause and meaning. Dreams may be said to have a world of their own, and to have no links of connection with any other facts in human experience. The savage regarded the dream-world as similar to, only more remote than, the one he dwelt in. When he fell asleep, his second self left his body for unfamiliar haunts, where he met the second self of his dead ancestors. Socrates believed in the divine origin of dreams. Lucretius accounted for them on the principle that ideas or thoughts were material things, which could be detached from each other and be made to strike upon the mind. Porphyry ascribed dreams to the influence of a good demon who warned the dreamer of the evils the bad demon was preparing for him. Baxter, in his work upon the soul, attributed dreams to the agency of good spirits, which descended from their proper sphere and condescended to weave midnight visions for poor mortals. As sleep has something awe-inspiring and inexplicable, so dreams

viewed from the waking state have no less strange or perplexing a reality.

Dreams have been defined as "conscious processes during sleep," a definition which implies a self-contradiction, for conscious processes deny sleep, and normal sleep is attended with unconsciousness; but this unconsciousness may indeed be slight, yet it is not infrequently profound and even complete. During deep sleep the senses are unaffected by external and even by internal impressions, yet it has been asserted that the mind is never at rest during sleep, and that there is always some dreaming. Dreams have also been defined as thoughts, or a series of thoughts, experienced in sleep, *i.e.*, a train of ideas presenting themselves to the mind during sleep. To-day, the definition of a dream is "the symbol of an unfulfilled wish," the meaning of the symbol having to be interpreted by an assumed psycho-analytic "code," and because of its symbolic function a dream is looked upon to-day as having its root firmly fixed in the experience of the waking life, whilst its superstructure lies in the unreality of phantasms. It may help to understand the terms symbol and symbolism, if we state that they are only applicable when the dream is interpreted, *i.e.*, the dream then becomes the symbol of the meaning elicited. The terms themselves apply to the dream as recorded or the manifest dream, which is always centralized round certain subjects connected with the waking experience, and not, as erroneously believed by some, always and invariably connected with sexual matters.

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affirmed that "God speaketh once, twice; yet man perceiveth it not." "In a dream, in a vision of the night when deep sleep fell upon man and sealed his instruction, He withdraws man from his purpose." In the New Testament, there are Joseph's dream, both before and after the birth of the Saviour, the dream of the three wise men, and the dream of Pilate's wife, which were all quoted as messages from the spiritual world. Shakespeare puts into the mouth of Mercutio the cause of dreams—"Which are the idle children of a brain, begot of nothing but a fantasy." Byron, Milton, Robert Louis Stevenson, who stated that the motives for his best romances were inspired by dreams, Coleridge, Moore, and John Bunyan have all dwelt upon this attractive subject; Bunyan stated that the whole of the Pilgrim's Progress was revealed to him in dreams. Certain races, like the North American Indians, are stated to look upon a dream as a sacred event, being the most ordinary way in which the gods make known their will to man. In the *Journal of a Voyage to North America*, Charlevoix relates how an Indian dreamed he had his hand cut off, which occurred the next day. The poor still have their dream-books, and they often pay for the "meaning" of their dreams.

It may help to clear our conception of the working of a dream, if we briefly state how the mind works normally in the waking state. All of us are brought up to observe certain conventionalities, and to regard with solicitude certain social laws and amenities. In consequence of this, feelings of undue assuredness, aggression, and self-assertiveness are kept under or repressed; out of regard for social customs, certain tendencies or passions are also kept under control, a feeling of self-restraint and inhibition being thus exercised. All of us, who are properly brought up, look upon ourselves with a certain compulsion in regard to observing the courtesies, ceremonies, and conventions of life, and our conduct is formulated accordingly. These compulsions eventually become automatic restraints, and they tend to keep up the structure and wholesomeness of human society. They constitute the feelings of social obligation and of personal regard for others, and are based upon certain instincts which have emotional representations, such as fear, anger, joy, sorrow, love, hate, and disgust.

When, let us say, an object is presented to one of the

senses, for instance, to the sense of sight, all the unconscious feelings of restraint, which have been instilled into us in youth and in grown-up people act automatically, are applied to the object we have in view, and our conduct or reaction towards it varies accordingly; for our unconscious life is always acting in numberless and unsuspected ways upon our conscious mental life. Supposing, for example, that we were watching a lady at some social function, who was wearing a green carnation. Certain rays of light from this object impinge upon the retina, which are conveyed to the brain and there stimulate a mental picture, *i.e.*, the outward form, figure, surrounding circumstances, time, and place of the person are appreciated as an external object, which, when absent, may be restored as an image, a picture, or idea upon the cerebral cortex; so that, in the absence of the object, an impression of the lady can be revived in memory upon the mind, the person being "remembered" with all her attendant associations. The mind recalls the occasion either with pleasure, or perhaps with pain, and, in idea the whole previous scene can be re-enacted, even to the recognition of personal charms, gestures, verbal movements, conversation, habits, and ways; these are accompanied by their emotional reactions. All can be revived as representative images, so that the mind is not only able to cognize the object, associated with a definite feeling, and with all the voluntary movements, but the image, or memory picture, may also be revived with all the accompaniments belonging to the original presentation. These three factors, *viz.*, cognition, feeling, and will, are the invariable accompaniments of every mental process, whether an object is presented from without or its picture is experienced from within. The same analogy applies to presentations and representations referring to the organic sensations. In dreams, these factors tend to become dissociated; the will remains in abeyance, whilst the cognitive elements may be represented alone, or grouped with others which are similar or dissimilar. The feelings may also be represented to the mind, and may either be painful or pleasurable. It is the will which refuses to act, and it is questionable whether a dream, once initiated, can ever be modified by the will, although some persons state that they are able to modify a dream, and that they have frequently done so.

The recollection of these dissociated elements of a dream,

when recalled by the memory, is often so weird, so striking, and so suggestive, that an attempt to interpret their meaning is inevitable, and the phenomena of dreams have thus become objects of conjecture, of curiosity, as well as of vivid interest. In consequence, many persons have endeavoured to read into them some hidden meaning, whilst others regard them with heedless indifference, considering them to be only a confused and jumbled record of sleep-memories unworthy of serious reflection. Possibly the truth in regard to dreams lies between these two extremes of undue scepticism and a too *facile* credence. It is difficult not to suspect a meaning in some dreams, as in the dream of Mrs. H., whose husband went to New York on business. She dreamed one night that he was sleeping on the tenth floor of a hotel which took fire, and that he escaped with difficulty. The next morning, feeling very uneasy, she cabled asking how he was, when he replied "quite well and safe, but had a narrow escape last night when the hotel was burnt down."

The following, sent to me by Dr. Leonard Guthrie, relates the experience of a credible witness, E. W. M., a distinguished scientist and F.R.S. In his own words, he writes:—

"When I lived in Canada, the following case occurred: 'An Englishman and an American clubbed together to try to reach the Klondyke goldfield, by the overland trail, *i.e.*, by going due north from the prairies, instead of following the usual course of crossing by the Canadian Pacific Railway to Vancouver, then taking steamer up the coast to Sitka, and crossing back over the mountains *viâ* White Horse Pass. After the pair had passed on their journey, what the American judged to be the outposts of civilisation, he shot the Englishman while he lay asleep, tried to destroy his body by burning it, rifled his baggage, taking everything of value, and returned. When he was questioned as to what had become of his companion, he replied that he (the American), had become discouraged and had given up the expedition, but that the Englishman had pushed on. But there was an encampment of Indians close to the spot where the crime had been committed. The old chief saw two men come north and encamp; in the night, he heard a shot and saw one man go south. He went to the camp, saw the body, and informed the nearest post of N.W. Mounted Police. They trailed the murderer, and

arrested him before he could escape across the U.S. border. He was brought to Regina. Meanwhile, the brother of the murdered man in England, had a dream in which he saw his absent brother lying dead and bloody on the ground. He came down next morning very depressed, told his dream, and announced his intention of going straight out to Canada to see if anything had happened to his brother. He arrived out as the trial of the murderer was progressing. He identified several articles in the possession of the murderer as the property of his late brother. The murderer was hanged at Regina.'"

Another dream of a prophetic nature, and relating to the assassination of Perceval, is recorded in the *Book of Days*, I., 617. I am further indebted to Dr. Guthrie for calling my attention to it. It was the dream of Mr. John Williams, of Sarrier House, near Redruth, in Cornwall. He died in 1841, and was described in the *Gentleman's Magazine* as a man of the highest integrity. On the night after the assassination, when the facts could not have been known to him by any ordinary means, he dreamt that he was in the Lobby of the House of Commons, although he had never been there in his life. He saw a short, small man enter, dressed in a blue coat and a white waistcoat. Immediately after him entered another man in a brown coat with yellow buttons. The latter drew out a pistol and shot the former, who instantly fell, blood pouring from a wound a little below the left breast. In his dream, Mr. Williams heard the report of the pistol, saw the blood flow out and stain the waistcoat, and he noticed the colour of the victim's face change. He further saw the murderer seized, and observed his countenance. When asking, in the dream, who had been shot, he was told "the Chancellor." Perceval was Chancellor of the Exchequer at the time. Mr. Williams then awoke and mentioned the matter to his wife, who made light of it. At her suggestion he went to sleep again, but dreamt the same dream a second time, and then a third. After this, between 1 and 2 a.m., he got up and dressed. In the forenoon of the next day he went to Falmouth, and related his dream again to Mr. Tucker, of Tremanton Castle, and his wife. Mr. Tucker replied that the description was like the Chancellor of the Exchequer, Perceval—although Mr. Williams had never seen Perceval, nor had anything to do with him. Just then the news of

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Another dream of a prophetic nature, and relating to the assassination of Perceval, is recorded in the *Book of Days*, I., 617. I am further indebted to Dr. Guthrie for calling my attention to it. It was the dream of Mr. John Williams, of Sarrier House, near Redruth, in Cornwall. He died in 1841, and was described in the *Gentleman's Magazine* as a man of the highest integrity. On the night after the assassination, when the facts could not have been known to him by any ordinary means, he dreamt that he was in the Lobby of the House of Commons, although he had never been there in his life. He saw a short, small man enter, dressed in a blue coat and a white waistcoat. Immediately after him entered another man in a brown coat with yellow buttons. The latter drew out a pistol and shot the former, who instantly fell, blood pouring from a wound a little below the left breast. In his dream, Mr. Williams heard the report of the pistol, saw the blood flow out and stain the waistcoat, and he noticed the colour of the victim's face change. He further saw the murderer seized, and observed his countenance. When asking, in the dream, who had been shot, he was told "the Chancellor." Perceval was Chancellor of the Exchequer at the time. Mr. Williams then awoke and mentioned the matter to his wife, who made light of it. At her suggestion he went to sleep again, but dreamt the same dream a second time, and then a third. After this, between 1 and 2 a.m., he got up and dressed. In the forenoon of the next day he went to Falmouth, and related his dream again to Mr. Tucker, of Tremanton Castle, and his wife. Mr. Tucker replied that the description was like the Chancellor of the Exchequer, Perceval—although Mr. Williams had never seen Perceval, nor had anything to do with him. Just then the news of

the assassination reached Truro, which was seven miles away. Six weeks after the event, Mr. Williams went to London and to the House of Commons. He recognized the Lobby, the exact spot where Perceval fell, and the dress of both men in the dream corresponded precisely with those actually worn at the time. The extraordinary thing about this dream was, that a minute account of it was published in *The Times*, another was given to Dr. Abercrombie, whilst Mr. Williams's grandson communicated an account drawn up from his grandfather's words. All these agreed in every detail with the first narrative of the dream recorded by Mr. Williams.

Whether we regard dreams as in any way prophetic or not, Andrew Lang has stated it is remarkable, when we consider the enormous number of dreams, that there are not more than occasional coincidences. The successes only are noted, while the failures as to prophecy have been forgotten. It was, probably, through the effort to elicit some meaning from dream phenomena that the idea of a soul first arose, and that this soul could exist apart from the body and survive its dissolution. The phenomena of dreams, or "visions" as they were called, suggested, as stated, excursions of the soul into some distant regions which it explored, and reported what it had experienced to the waking soul, so that if the dream were of the dead, the soul was believed to have travelled to the regions of the dead, and, if of the living, then the soul had wandered into the society of other living souls, and had some message of importance to convey to the dreamer, if only it could be properly and adequately interpreted or explained. Thus, they were "symbols" of some message to be imparted by a supernatural being, *i.e.*, if the dream could be properly solved. This "symbolical" view has been revived to-day, although the symbols are erroneously interpreted to be those of sexual disturbances. The interpreter of dream messages, or the "seer" as he was called in ancient times, was, naturally, a sacred person who came to be regarded with considerable importance, if not with prophetic awe and as of divine origin. Thus, arose the magician, or the "wise man," whose survival was formerly represented by uncultured and irresponsible fortune-tellers, but who are, to-day, represented by competent and able psychologists, who, by methodically arranging and sorting the spontaneously uttered thoughts of a person who

submits to examination, or by comparing the verbal association of a series of responses, ascertain the workings of the unconscious mind which lies beneath the manifest dream. According to the teachings of certain psychologists, all thoughts and actions are assumed to be coloured by, if indeed they do not directly arise out of, the unconscious mind.

The careful study of the mental life, normal and morbid, has been the work of modern science, which has elucidated and solved many of the dream combinations—together with other products of the imagination—by the acceptance of that intimate union which exists between mind and body. Upon the close relationship between mind and body, it has been found that the chaotic play of images in dreams is able to throw much light upon the normal mental processes and upon the laws which are observable in the working of the mind during the waking state. Hence, the appropriateness of studying dreams in this new light, and the justification of a claim for those who study dreams to-day, truly to be called "interpreters," for they investigate upon the solid and substantial ground of science the intimate and fundamental activities of the human mind in health and disease, without the need of resorting to supernatural agencies which had to be invoked in former days.

The interpretation of dreams by the psycho-analytic method is based upon the theory, that in the hidden mentalities or "unconsciousnesses" of our minds are found the explanation, perhaps the secret, at any rate the quite sufficient interpretation of many abnormal mental occurrences and divergent mental states, such as dreams, lapses of memory, absent-mindedness, obsessions, delusions, and all kinds of intrusions and dominations of semi-repressed thoughts.

It is hardly necessary to state that dreaming is not confined or limited to human beings. We are familiar with the sight of dogs which jump and bark in their sleep, more especially after active excursions, or following upon hunting expeditions; those who keep canaries have doubtless heard their unexpected pipings whilst asleep.

In order to understand the nature of dreams, it may be desirable to consider the physiology of sleep, and although the exact cause of sleep is not definitely known, the con-

comitants of sleep are familiar. We know, for instance, that in sleep all the normal activities of the organism are appreciably lowered, and it is not certain that sleep itself is not a state of debility, for there is a lowering of the pulse rate, and of the blood-pressure; there is also a slowing down of respiration. There is, probably in addition, a state of venous engorgement, permitting the products of fatigue to pass by osmosis into the blood-stream or into the lymph-channels during this engorgement, which is favoured by the supine position of the body when at rest, thus giving a better supply of blood to the head, and so predisposing the brain to dreaming. Yet we do not know the inner state of the organ of mind, *i.e.*, the intimate structure of the cells in the brain cortex during sleep, nor their relation and dependence upon the ductless glands, in particular the pituitary, as has been pointed out during hibernation. In regard to the nerve cells, therefore, conjecture must take the place of certainty. The brain cortex, normally, is composed of innumerable cells and fibres, the latter forming the connecting links and threads between the cells; their function is to convey sense-impressions from without the body, and then to convey these transformed impressions outwards for the control and proper working of the various organs in the body.

In an average brain, the cells or neurons are computed to number 9,000 millions, so a thought, or an idea, or a purpose initiated in one cell, or a group of cells, is immediately linked up with thoughts from scores or hundreds of others by means of these fine connecting fibres. It is believed (Lépine) that the fine fibres—which are called dendrites, from their tree-like appearance—undergo a retraction during sleep leading to a partial separation of their terminations, thus leaving a space, so to speak, which cuts off nerve currents and so induces sleep. This being a theory only, it has naturally evoked another and an opposite explanation of sleep, *viz.*, that sleep accompanies a greater and more extensive prolongation outwards of the fine nerve processes of the cells (Lugaro), which then touch each other more closely and intimately, thus diffusing, rather than concentrating, nerve energy, the effect of such a diffusion being to lower nerve potential, and so to bring about a general loss

of nerve energy and thus to favour sleep. The whole nervous system presumably participates in this lowering activity of the circulatory and other systems during sleep, yet it is not ascertained whether this lowering is sufficient to interrupt the continuity of the unconscious as well as of the conscious life.

Dreaming, as is well known, can be induced by such agents as opium, alcohol, and tobacco, and this would favour the view that dreaming was a morbid process. It is certainly a process which more often occurs just before or just after the actual state of sleep, and for that reason, these dreams are called "hypnagogic." It is general experience, that there are more clear, as well as more fantastic, images just before going to sleep, or just before being thoroughly awakened, than occur during complete unconsciousness. It is doubtless, too, within the experience of everyone, that the vivid scenes of the day are more clearly impressed upon the mind during the intermediate state between sleeping and waking than during sleep. Children often dream before going to sleep of events which occurred the previous day. The *Daisy Chain*, by Charlotte Yonge, caused dreams of carriage accidents, and *Peter Pan* caused dreams of flying to the Never Never Land in the case of a clever impressionable child.

The materials of which dreams are made are chiefly memories of past experiences, although they are often modified by the influence of temperament and environment. Most dreams are buried in the unconscious mind, which is partly the reason that they can so rarely be remembered fully after waking; this is certainly the case with children. It is believed that the age of greatest dreaming, as well as that of the most vivid dreams, is between twenty and twenty-five years. Women sleep more lightly, and dream more than men do; it is certain, at any rate, that more women than men relate their dreams, and women who are accustomed to dream sleep longer. The majority of dreams occur after 6 a.m., although many occur before 4 o'clock. The time during which a dream is enacted is wonderfully short, a few seconds of time in a dream would be equivalent to days in the waking state, and many dreams may be recorded in support of this statement. The precipitation of images in a dream is so great, and the attention so lacking in precision,

comitants of sleep are familiar. We know, for instance, that in sleep all the normal activities of the organism are appreciably lowered, and it is not certain that sleep itself is not a state of debility, for there is a lowering of the pulse rate, and of the blood-pressure; there is also a slowing down of respiration. There is, probably in addition, a state of venous engorgement, permitting the products of fatigue to pass by osmosis into the blood-stream or into the lymph-channels during this engorgement, which is favoured by the supine position of the body when at rest, thus giving a better supply of blood to the head, and so predisposing the brain to dreaming. Yet we do not know the inner state of the organ of mind, *i.e.*, the intimate structure of the cells in the brain cortex during sleep, nor their relation and dependence upon the ductless glands, in particular the pituitary, as has been pointed out during hibernation. In regard to the nerve cells, therefore, conjecture must take the place of certainty. The brain cortex, normally, is composed of innumerable cells and fibres, the latter forming the connecting links and threads between the cells; their function is to convey sense-impressions from without the body, and then to convey these transformed impressions outwards for the control and proper working of the various organs in the body.

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mental weakness. A lady under my care, C.W., dreamt she had, during the night, cut her husband's throat and thrown his body out of the window. She grieved, worried, and became so distressed at her imaginary, murderous conduct towards her innocent partner that her mind became deranged, and she lapsed temporarily into acute insanity. A man, C. V., used to dream that he had destroyed St. Bartholomew's Church, and was so alarmed at the notion he could be guilty of such sacrilege that he feared going to sleep, and he also became insane. Another man, H. K., after the last air raid, dreamt that his room was being "bombed"; in his dream he saw the explosion, smelt the asphyxiating gas, heard the crackling of the fire, and from that moment his mind seemed to give way. It is quite open to argument whether, in each case, the dream was not the first symptom of the mental breakdown caused by fear.

It may not always be easy to separate hallucinations from dreams, but it is a fact that insane persons dream more often than do the sane, and the continued presence of hallucinations in them, together with the natural wish to explain hallucinations by some plausible but erroneous factor, causes the insane mind to be one which is readily responsive to slight stimuli. It certainly explains why the insane are light sleepers, and are more frequently disturbed by imagined causes than the sane. The rays of the moon, penetrating between the folds of a curtain or along the margins of a window-blind, not only disturb sleep by the light they shed, but may also suggest the figures of persons sent to watch them, or to endanger their lives; hence the wakefulness and dreams of the insane, and the general belief is true that these frequently experience exacerbations of their illness during a full moon. It is a fact, known to physicians, that many of our wounded soldiers home from the trenches suffer from dreams of a fearful and horrifying kind, due to the memory of constant explosions, and of the awful effects of exploding shells upon human life. These dreams are accompanied with all the physical symptoms of fear; there is present a lowering of the surface temperature, there is also the blanched face, the anxious expression, and the perspiring skin.

Dreams are closely related to the condition described as somnambulism, which is one of intense abstraction and

that there is nothing to regulate them in time. An analysis of dreams points out that in the great majority, 60 per cent. of them relate to sight, so that the ancients were correct in describing them as "visions," whilst only 5 per cent. relate to the sense of hearing. Three per cent. have reference to taste, and only 1.5 per cent. to smell. In dreams, the two senses, taste and smell, which are the oldest, most primitive, fixed, and organized of the senses, frequently attach themselves to sight and hearing, which, nevertheless, are more easily disturbed because more highly evolutionized, the objects to which taste and smell relate being thus visualized or heard.

The faculties of the mind, to borrow an abstraction, "go to sleep," as it were, in certain orders. We know that we feel fatigue so far as our "judgement" is concerned sooner than we do in regard to our sensory life; we hear sounds during a light sleep, and are sensitive to rays of light or to the sense of touch. But, because the power of forming a judgement is affected, early in sleep, there are imperfect associations; and images, phantasies and dreams arise, which are the common experience of all. Some power of association and some power of judgement are left in light sleep, but the lessened power of these two "faculties" in dreams reveals the unrestrained, incongruous, and disorderly pictures left on the mind.

It has often been pointed out that insanity and dreams are allied so closely, that insanity has been described as a "waking dream," and a dream as a "sleeping insanity." The insane, like dreamers, are under the domination and control of illusions and hallucinations, but they adhere to their dreams or delusions, and no appeal to the senses, to reason, or to the judgement, can reconstruct their mind; whilst dreamers, so long as they remain in the dream state, continue to experience their "insanity"; a reference to a fixed objective standard being impossible during sleep, so that the mind, for the time being, remains unsound. Here, however, the similitude ends, for, upon an appeal to the senses and to reason the dreamer awakes, whereas the insane person continues in his unreason.

It has been stated that dreams may be followed by insanity, and my experience confirms this, although it is doubtful if a dream can ever be the actual cause of insanity, both being probably the product of an already existing

were performed without the knowledge of the cognitive self; one forgets, for instance, a line of poetry, but remembers it later when one has ceased, consciously, to think of it. In the course of conversation one may forget a word, and, having "waited and seen," the word recurs later without effort, perhaps, when the attention is engaged elsewhere. This tends to show that there are unconscious mental excitations going on of whose nature we are ignorant, but the thoughts are there in the unconscious mind all the same, and they seem to be interposed between conscious ideas and to be dug up, as it were, with them. Possibly every conscious idea arises out of and dies away into an unconscious mental state, and according to some there are three degrees or kinds of thoughts: firstly, thoughts of which we are conscious, and which, when given attention to, are raised into what is called the "focus" of consciousness; secondly, thoughts which are in the rest of the field of consciousness, which are present, but only in a state of inattention—for instance, in the theatre we are intent upon the evolution of dramatic situations, but are inattentive to the audience or oblivious to the staging. The third depth whence thoughts emerge is the unconscious area in which these could not attract attention until their position had been raised into the full and clear focus of attention by some association or suggestion.

It is preferable, I think, to limit the term "sub-consciousness" to the second of these states in which there is still present a certain limited sensitiveness left to ordinary sense-impression, whilst the "unconscious" state represents the third, *i.e.*, the primitive mind, so to speak, out of which conscious thoughts and intellectual processes rise and grow.

The motive force of our acts is believed by some to take its origin in the unconscious mind, whilst the directive and controlling force is in the upper conscious levels, which thus regulate the lower.

The technical analysis of dreams assumes that there is a dynamic trend of "desire" in the unconscious mind, which is ever seeking for the gratification of personal feelings, passions, and sentiments as against the controlled thoughts of the conscious mind. Psychologists who urge this trend or tendency in the unconscious mind, assert that it is kept back and restrained by some imagined power called the "endo-

nearer to wakefulness than is the dream state. The sleep-walker is guided by the motive which actuated his waking moments, and he sometimes executes performances with a degree of perfection which is not even possible to one in perfect possession of his senses. I have known a nurse get up in the middle of the night, collect all the patients' day attire, and arrange the clothing for about 40 patients at the foot of each bed, after which she proceeded to collect all plants and flowers from an adjoining bathroom and place them in the ward, as in the daytime. She then retired to rest, but, upon awakening, she had forgotten all the details of the sleep-walking incident.

The state described as "abstraction" or "reverie" is also related to the dream state. In this, the attention is so fixed and concentrated upon a train of ideas that, although the eyes are open and sounds are heard, yet no impression is made upon them by external objects. In the condition described as "ecstasy," figures and landscapes may be seen as real; the former are most often seen by religious devotees and sojourners in the cloister. Blake, the artist, was able to concentrate his attention upon his dreams so as to remove all distraction. He could paint portraits without sitters, although these were so real to his imagination that he would carry on conversations with them whilst painting their portraits. Among those whom he thus painted were King Edward I. and Queen Catherine of Aragon.

Another state of mental abstraction is the pleasant and extravagant kind called "castle-building in Spain," a condition in which imaginary scenes of an agreeable form are constructed and indulged in for the enjoyment or satisfaction anticipated. "Day-dreaming" is another state which is an entertainment that has probably been practised on occasion by each of my readers. "Trance," "lethargy," "catalepsy"—when the mind is concentrated upon an absorbing but narrow range of ideas—are also related to dreams, and so are the "hypnotic" and other states of partial consciousness, but they cannot be entered into here.

We have referred to the "unconscious mind"; the phrase is so frequently met with, that it is used in various senses. Carpenter used it in reference to certain psychical states, which he described as "unconscious cerebration," during which acts

were performed without the knowledge of the cognitive self; one forgets, for instance, a line of poetry, but remembers it later when one has ceased, consciously, to think of it. In the course of conversation one may forget a word, and, having "waited and seen," the word recurs later without effort, perhaps, when the attention is engaged elsewhere. This tends to show that there are unconscious mental excitations going on of whose nature we are ignorant, but the thoughts are there in the unconscious mind all the same, and they seem to be interposed between conscious ideas and to be dug up, as it were, with them. Possibly every conscious idea arises out of and dies away into an unconscious mental state, and according to some there are three degrees or kinds of thoughts: firstly, thoughts of which we are conscious, and which, when given attention to, are raised into what is called the "focus" of consciousness; secondly, thoughts which are in the rest of the field of consciousness, which are present, but only in a state of inattention—for instance, in the theatre we are intent upon the evolution of dramatic situations, but are inattentive to the audience or oblivious to the staging. The third depth whence thoughts emerge is the unconscious area in which these could not attract attention until their position had been raised into the full and clear focus of attention by some association or suggestion.

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psychic censor," a purely fictitious and artificial ego which is continually struggling to repress the natural impulses and thoughts not acceptable to consciousness, this "censor" exercising a guardianship over sleep, even the deepest sleep. These psychologists describe the unconscious mind as an under-world of painful memories and wishes always seeking to obtrude themselves, and always in health being more or less successfully kept under, "like steam in a kettle," by the artificial censor. When the passions emerge in the conflict, they become the "latent" cause of dreams, obsessions, and longings; if dreams be the result, then the dream as remembered or recorded is the "manifest" dream, and the interpreter immediately attempts to elicit the latent wish of which the manifest dream is the symbol. By this analysis, a clue is furnished to the real aim and personality of the dreamer.

Dreams are thus the resultant of a conflict between the censor and the repressed idea, the dream being the "compromise," and only to be solved by a code, for which an array of symbolism has been invented to serve as a key for its interpretation. If the dream be of the sea, for instance, then, according to the followers of Freud, who have initiated this sex meaning, it stands as a symbol for "life;" for, in their own words, "life" needs the mightiest symbol, because existence depends upon the mighty and profound procreative force. If the dream be of an old house, then it is interpreted to be "the abode of life," and, to use the Freudian expression of the dream analysts, "we find it necessary to predicate a creative, myth-making tendency in the structure of the mind, by means of which the currents of life beneath all thought become articulate."

This sexual theory is over-emphasized, and the Freudians, who urge sex as the basic origin of all dreams, of all obsessions, and of all longings, impulses, and neuroses are "sex-intoxicated," for in life's reality there are other primary and original instincts as well as sex, of which fear, anger, hunger, and the search for warmth are the commonest examples. All these run deep in the unconscious mind, and each has suffered far more repression than sex. It is against human experience that all dreams are desires, and it is repulsive that all dreams should be interpreted as relating to sex, and such an explanation has

brought these conclusions of what have been called "chimney-sweeping investigations" into deserved disrepute. In the analysis of dreams, the method adopted for exploring the unconscious mind depends upon inferences drawn from what has been described as free or spontaneous association, "word association," and reaction time. The latter has been much used in America as an auxiliary for the detection of crime by means of an instrument of extremely delicate mechanism, the examination revealing a shortened reaction period to word association if the accused be innocent, whilst the reaction period is longer if the accused be guilty, for he is endeavouring to keep back thoughts suggested to the mind in connection with the words presented.

What is the association of dreams with crime? I have questioned insane criminals about their dreams in connection with specific crimes, and although there is always some reserve about admitting revelations in connection with criminal acts, I find that they dream much as do other people. In this class, there is a considerable difficulty in proving their hidden personal secrets, and in overcoming the resistance of the so-called "censor." In these cases, the conscious and the unconscious cannot easily be brought together, and a clue to their desires, impulses, or wishes is extremely difficult to ascertain. Moreover, this class is not an easy one to investigate; many of the criminal classes being mentally defective, although some are only morally so, especially as regards prudential considerations for they cannot postpone present pleasure for future good; they are easily tempted, and easily yield, and they have a diminished emotional as well as intellectual endowment. The "criminal type" is impulsive, and though they may not be insane they have often a psychopathic inheritance and tendencies. Their psycho-anthropological characters may be summarized as egotistic and anti-social, and they are not easy material for the psychological analyst.

The discovery of crime through a dream, when the dreamer has by his own dream given himself away, is unknown to me in real life, and this is supported by the extensive experience of Dr. W. C. Sullivan. Dr. Leonard Guthrie reminds me of the story of the murder of Maria Martin, by Corder, in 1827, when dreams led to the discovery

psychic censor," a purely fictitious and artificial ego which is continually struggling to repress the natural impulses and thoughts not acceptable to consciousness, this "censor" exercising a guardianship over sleep, even the deepest sleep. These psychologists describe the unconscious mind as an under-world of painful memories and wishes always seeking to obtrude themselves, and always in health being more or less successfully kept under, "like steam in a kettle," by the artificial censor. When the passions emerge in the conflict, they become the "latent" cause of dreams, obsessions, and longings; if dreams be the result, then the dream as remembered or recorded is the "manifest" dream, and the interpreter immediately attempts to elicit the latent wish of which the manifest dream is the symbol. By this analysis, a clue is furnished to the real aim and personality of the dreamer.

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the sufferer and by her disregarded, the result is claimed as a cure obtained by a "cathartic," a word which is meant to signify suggestion, auto-hypnosis, or, as more recently hinted, "auto-gnosis."

I have quoted the above to show the complicated vocabulary invented by some psychologists to explain dreams, which, as Bergson points out, are only states of "relaxed consciousness." In the waking state, we are always adapting ourselves to our needs, but in sleep we have ceased to select and choose. The mind in its relaxed state brings together memory associations, which were formerly packed away in the "storehouse of the unconscious mind"; the reason fills up the gaps, and a confused impression results, which is the material of dreams.

As is well known, the brain cortex is restored and refreshed only during sleep, and it is a comfort to know that we dream most of events to which no attention has been paid. Were it not so, our sleep would be distracted and pre-occupied by events of importance, which have been our greatest concern during the day, so that our waking life would be prolonged as a permanent dream into the sleeping life, and the necessary restoration and nutrition of the brain would be impossible.

It is most welcome that the revival of interest in dreams should have awakened the psychologist, the physiologist, and the philosopher, but one realizes that progress must be at the expense of some long-held views or traditions. Unfortunately, in this instance—if progress can be claimed—it is at the expense of some cherished proprieties, and I venture to think there has been an unnecessary pandering to the lower instincts of men and women on the part of those who describe themselves as psycho-analysts. I believe that in the full pursuit of this craft there has been a distinct over-stepping of the decencies of sex, on the part of some who have worked upon these investigations. The foreign teachers who have been responsible for employing these "sex-mad methods" to reveal the unconscious mind, have, so far as this country is concerned, already received the recognition of a posthumous notice of their labours, and it would not be incorrect to state that among psychiatrists—in this country at any rate—Freudism is dead.

of the victim's body. As he also points out, there are numerous instances of murders having been discovered and avenged by the appearance of the murdered person's ghost. Shakespeare presents two instances in *Hamlet* and *Macbeth*. "The Bells," in which Irving represented the miller Mathias, exemplifies a drama in which the murderer is being continually haunted by the dream-sound of the sleigh-bells, and in Tom Hood's "Dream of Eugene Aram," "the unknown facts of guilty acts are seen in dreams from God." The usher, Eugene Aram, dreamed of the murder he had committed, and related it long afterwards to the boy, "the horrid thing pursues my soul, it stands before me now;" "that very night two stern-faced men set out from Lynn, and Eugene Aram walked between with gyves upon his wrists." The suggestion here made connects the dream with the murderer's arrest. Hack Tuke relates a remarkable instance of a man dreaming that he had performed an act which rendered him liable to legal consequences, and for which he had been arrested. On awaking, he was greatly relieved to find it was only a dream, but in the course of two or three days he committed the act in an insane condition of mind. He was arrested and brought before the court for trial, but was released to the care of his friends. There is no record of psycho-analysis assisting in or leading to the detection of crime, not even crimes relating to sex, for which the Freudians claim a peculiar affinity.

It will be admitted that a most puzzling terminology has arisen from the efforts made by medical psychologists to analyse dreams. If the dreamer fails to recognize the new and strange scenes in which the manifest dream is situated, this is owing to its "dramatization," and if the characters are unrecognizable, there is "distortion." Should the chief characters be given a subordinate position, there is a "displacement," but not infrequently there occurs a fusion of the characters, which is "condensation." When the ideas in a dream become detached from their usual association and are "converted" into some other psychic sphere, then they are being "sublimated" into some obsession or delusion. Hysteria, for instance, is the "conversion" of a "repressed" idea into some motor and sensory discharge, and if only the idea can be disclosed to

War, to look backward for a moment, and to review, briefly, the progress of our continued efforts in the direction of cancer research, both experimental and practical, during the past two years.

LINES OF RESEARCH AT THE BEGINNING OF THE WAR.

Official bulletins and other publications issued during the first half of 1914, or before the fateful ultimatum of July 23 of that year plunged so much of the world into conflict, show, among others, the following lines of experimental and clinical investigation: metastasis formation; bio-chemical problems; changes produced in malignant neoplasms by radiant energy; alterations in tumour growth effected through diet and other external factors; the production of immunity; transmissibility; heredity; early diagnosis (serological and other tests); prevention (through a campaign of education); treatment (by chemical, physical and surgical means).

It is impossible, in a brief review, to encompass all the work represented in the published reports of the various investigators; attention will, therefore, be directed to certain lines of research which bear most intimately upon the clinical or practical aspects of the cancer problem, viz., those which involve: (1) the ætiology; (2) the early diagnosis; (3) the prevention; (4) the treatment.

ÆTIOLOGY.

Heredity.—Among the various questions concerned with the cause of cancer, that which deals with the possible influence of heredity has received, perhaps, the greatest amount of attention, and has aroused the keenest interest, among both the medical profession and the public, during the past two years.

The awakening, or re-awakening, of interest in this particular phase of the problem may be said to have resulted from the presentation by Miss Maud Slye, of Chicago, before the American Medical Association, at its annual meeting in 1914, of her exhibit, giving the results of her observations on a large number of mice. Loeb, Tyzzer, and others, had already devoted considerable attention to the question of heredity in connection with malignant disease, but the

THE CANCER PROBLEM AND THE WORLD WAR.

A BRIEF RÉSUMÉ OF WHAT HAS BEEN ACCOMPLISHED IN AMERICA
DURING THE PAST TWO YEARS

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CONSIDERABLE interest was manifested a few months ago, by the secular—as well as the medical press of America, in the arrival in New York City of the “cancer mice,” sent by the Imperial Cancer Research Fund of London to the Crocker Cancer Research Laboratory, for safe-keeping until the end of the War. The incident was significant from several points of view.

In the first place, with the destructive possibilities of the Great War, there was always danger of losing these valuable little hosts of “cancer strains,” the interruption of which would mean serious disadvantage in the particular line of research in which the mice are involved.

Furthermore, the exigencies of war have practically stopped cancer research, for the time being, in the European laboratories, the great London institution from which the mice were sent being no exception to the general rule. The responsibility for the continuation of the various lines of experimental investigation has thus been thrown largely upon the research institutions of the United States.

Still further, with all European hospitals taxed to the utmost with the sick and wounded victims of the War, little time has been left for the surgeons of those countries to devote to the further study of the clinical side of the cancer problem. And so, again, the work of continuing the development of the many purely practical phases of this great question has devolved largely upon the medical profession of the countries not engaged in the world conflict.

It may be timely, therefore, with the third year of the

phase of work until the full significance of intrinsic or inherited factors and the mode of their inheritance is understood. "The dogma," he says, "that inheritance is of no importance with respect to cancer, which has so long been taught in the course of medical education, is based upon obsolete hypotheses of inheritance, and should be given no further credence. The question at the present time is an open one demanding further investigation, for which the experimental breeding of species in which tumours frequently occur is to be considered as one of the most fertile fields of tumour research. After certain facts relating to inherited tendencies are established, as the result of animal experimentation, their final application to the human being may then be tested."

Another, and perhaps a more imminently practical, phase of heredity has been studied by Loeb,⁴ of the Department of Comparative Pathology, Washington University, St. Louis.

Following his preliminary studies of 1901 and 1902, Loeb, in 1907, undertook an analysis of the influence of the ovary, and especially of the corpus luteum, in the spontaneous development of mammary cancer in mice. He showed that it is possible to produce "transitory" uterine tumours in various animals through the co-ordinate action of an internal secretion of the corpus luteum and of mechanical factors. He described these new formations, which had the structure of maternal placenta, as "deciduomata" or "placentomata." He described them as "transitory," because retrogressive changes set in after a certain time, the newly-formed tissue finally becoming necrotic. Two sets of factors, it is held, in the ætiology of cancer were established by the investigations conducted by Loeb and his co-workers, viz., (1) hereditary factors, and (2) chemical actions exerted by an internal secretion.

"We could show," Loeb holds (1), "that the hereditary factors are not identical with the internal secretion, and do not act by changing the number of corpora lutea and their activity, but that their point of attack is somewhere else. It appears probable that, with the co-operation of hereditary conditions, all those internal secretions are factors in the origin of cancer, which initiate or sustain continuous or

rather spectacular entrance of Miss Slye upon the field served to send "heredity data" broadcast upon the printed page.

Following up her first reports, Miss Slye¹ presented before the Association for Cancer Research, in April, 1915, the results of her findings from 10,000 mice necropsies, showing more than a thousand tumours in these animals. From these studies she was convinced that, whatever the ultimate nature of cancer may prove to be, it is certain that it follows the laws of heredity, "not only in the transmission of cancer in general, but also in the transmission of cancer of specific organs, with an inevitableness which makes it a character that can be manipulated." She holds that there is transmitted a tendency for cancer to occur from a given provocation, such as acute or chronic over-irritation, and that the elimination, as far as possible, of this provocative factor, however manifested, from individuals of high cancer ancestry, should go far toward lessening the incidence of cancer. And further, "the eugenic control of matings, so that cancer shall at least not be present or potential in both sides of the hybrid cross, ought to eventuate in a considerable decrease in the frequency of human cancer."

Referring to Miss Slye's application of the Mendelian principle to her findings, Little,² of the Harvard Medical School, challenged her observations regarding a type of colour inheritance, as being quite contrary to the more generally accepted principles of Mendelian inheritance. Her subsequent denial of any desire or intention to apply a Mendelian interpretation to her experimental results, Little remarks, is "an extremely important postscript to her paper, since it makes it impossible to expect the exact numerical predictions in crosses which her reviewers have believed could be made."

Despite the fact that the methods have been "biological and more or less crude," Tyzzer³ holds that the work with reference to heredity has yielded remarkable results, "in that this branch of science, with the establishment of Mendel's law of heredity, now has a mathematical basis on which definitely to prophesy results." He considers it premature, however, to generalize from advances in this

phase of work until the full significance of intrinsic or inherited factors and the mode of their inheritance is understood. "The dogma," he says, "that inheritance is of no importance with respect to cancer, which has so long been taught in the course of medical education, is based upon obsolete hypotheses of inheritance, and should be given no further credence. The question at the present time is an open one demanding further investigation, for which the experimental breeding of species in which tumours frequently occur is to be considered as one of the most fertile fields of tumour research. After certain facts relating to inherited tendencies are established, as the result of animal experimentation, their final application to the human being may then be tested."

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periodic growth processes." Other factors, such as mechanical stimulation and the presence of micro-organisms, are suggested as possibilities, but whether or not these additional factors enter, he considers the first two (heredity and internal secretion) sufficiently strong to determine, to a great extent, the frequency of cancer in mice.

Wood,⁵ of the Crocker Research Laboratory, holds that, "while there is little reason, at the present time, to believe that heredity plays an important part in the occurrence of cancer, yet certain experiments in breeding mice have suggested that, in these animals at least, and in certain strains only, cancer may be subject to the laws of heredity. That these observations apply to man is doubtful, and the question can be settled only by very extensive studies which are of much more final value than breeding experiments."

The immediate and practical outcome of these investigations, as I have pointed out elsewhere,⁶ is met by the surgeon whose practice embraces a large number of cases of cancer, and whose patients afflicted with this disease have come within the pale of the "campaign of education concerning cancer," through lectures, printed matter, or otherwise. It cannot be gainsaid that it is of importance that such problems concerning the origin and perpetuation of cancer should be investigated thoroughly in the laboratory, and that clinical data should be collected, wherever possible, which may later be correlated with experimental data. It is most unfortunate, however, that, at this stage of investigation, anyone should urge the "eugenic control matings" for the control of cancer in human beings.

Transmissibility.—The investigation of this phase of cancer ætiology has continued to centre largely about the interesting experiments of Peyton Rous, of the Rockefeller Institute, with the transmission of sarcoma in chickens, by means of extracts obtained by crushing the growths and passing them through a Berkfeld filter. Ewing,⁷ in discussing the significance of this tumour, calls attention to the difficulties encountered because of the lack of understanding of avian pathology. "One would hesitate," he says, "to apply the standards of human pathology to the tissue reactions of the chicken." "While the data are still inadequate to force any conclusion," he continues, "I have

received the impression that Rous's sarcoma is a genuine neoplasm, occurring only in the chicken, and that the transmissible virus is of chemical, and possibly of ferment, nature. The extensive series of transplants has probably intensified the action of any such chemical agent present in the original tumour, so that effects are now being produced with this tumour, which were not possible with the spontaneous growth, and which probably have no counterpart in any process spontaneously occurring in nature. At any rate, the principles deduced from this process must, for the present, be applied to this disease and to no other." He calls attention, however, to the probable influence, in some human tumours, of chemical agents such as may be active in the chicken sarcoma. "While many tumours, after their area of origin is defined, grow exclusively from their own resources, others grow by progressive inclusion of previously normal cells in the tumour source." This principle, according to Ewing, comes to light under various different circumstances, and may be employed to account for the diffuse spreading of multiple tumours of serous, mucous, or cutaneous surfaces, and in systemic tumours of lymph-nodes; for collateral hyperplasia about the edges of some tumours; for Paget's disease covering much of the chest and trunk; and for the neoplastic proliferation of liver cells about hepatic metastases, excited by the pigment of melanoma.

Biochemical Cancer Stimulus.—"Is there anything in pre-cancerous conditions," asks Calkins,⁸ in discussing his experiments with cancer and normal tissue on a free, living ciliated protozoon, "to indicate an accumulation of products of destructive metabolism or of autolysis which will act as externally introduced stimulants on the normal cells?" The main problem of the cause of cancer, according to this observer, may be approached by way of this secondary problem. In summarizing the results of his observations of the effects of cancer tissue on protozoa, Calkins finds such a clue to the causation of cancer in the well-known facts which associate chronic irritation with pre-cancerous and cancerous conditions.

To prove or disprove each step of this theory of the cause of cancer empirically, however, as Calkins observes, is the work of years; "but an advance step in this direction

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making no claims that the organisms which he has isolated, and with which he has produced tumours at will, are the cause of human cancer, yet holds that they induce a set of phenomena which, allowing for the differences between the higher plants and animals, follow a strikingly parallel course. He is of the opinion that the "very iconoclastic and suggestive fact," developed by Rous, that sarcoma in fowls is due to a filterable virus—"to a something separable from the cell itself, which can persist after the death of the cell"—is significant in this connection. He considers that this may be regarded "as having advanced the subject a great way in the direction of the contention that human and animal cancer is due to an intracellular parasite, since we know of no chemical substance, enzyme or other, capable of multiplying itself indefinitely."

From the point of view of therapeutics, any findings with reference to a parasitic stimulus in the production of cancer in fish, animals, and plants are as yet without application to human beings. Their only immediate practical bearing may be said to concern the campaign of education, and the confusion and harm caused in the minds of the public through the too free dissemination of the data relative to the findings of these investigators. That these lines of research are considered of importance, however, may be seen from the pages of the July issue of the *Journal of Cancer Research*, which represents, to a large extent, the output of the various laboratories to date.

While the work of the last two years, some of which has been mentioned above, has been important, especially as continuing promising lines of research, nothing has been developed thereby to encourage one to look for a speedy solution of the cause of cancer.

On the other hand, as Ewing¹² has pointed out, there seems to be reason for "regarding all forms of neoplasms as specific diseases, connected only by the fact that they are neoplastic in greater or less degree, but differing in their ætiology, clinical course, and therapeutic possibilities."

In other words, it would seem that the term *cancer* is still being applied to a pathological composite, capable of further separation into different disease entities, each, perhaps, having its own peculiarities of cause and course,

is now under way in the attempt to localize experimentally the factors in autolysing tissue capable of stimulating cellular activities, and to distinguish them from the lethal factors."

Gaertner,⁹ in continuing his investigations concerning the possible causal relationship between cancer and a "nitrogenized auto-intoxicated lymph," considers that the chemical studies of Rous's serum in chicken sarcoma have verified the excessive nitrogen infiltration which he holds to be so largely concerned in the production of this disease. The transformation of a pre-cancerous lesion into cancer, which Gaertner considers more a matter of accident than of sequence, "is not a metamorphosis of the existing diseased tissues, but a supra-activated, aggressive process of its underlying, highly stimulated, normal tissue, due to loss of ferments to defend the underlying cells against foreign, or toxic, protein products; in other words, an excess of pathological nitrogen lymph." This is substantiated, he holds, by finding an increase of non-coagulable nitrogen in the blood, and an increase of colloidal nitrogen in the urine of cancer subjects; and, finally, by the fact that cancer toxæmia and death are due to uræmic nitrogen poisoning.

Whether, out of all these investigations, there will be discovered a bio-chemical stimulus (perhaps of endocrinic origin) as the provocative factor in the production of cancer must be determined in future. It is, at any rate, an interesting field for further research, and one having a definite bearing upon the treatment of cancer.

Parasitic Stimulus.—Investigations bearing upon the possible parasitic origin and infectious nature of cancer have been continued by Gaylord¹⁰ and his associates, at the State Institute for the Study of Malignant Disease, Buffalo, N.Y., and by Smith¹¹ and his co-workers, at the Laboratory of Plant Industry, United States Department of Agriculture.

The further observations of Gaylord have strengthened his belief that endemic goitre and carcinoma of the thyroid in the *Salmonidæ* are the same disease, and that the agent causing the disease is a living organism. The effect of this observer's previous pronouncements, with reference to cancer in fish, upon the fisheries of certain sections is doubtless not forgotten.

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tangible hope of a speedy transference of this possibility to the category of certainty, or even of probability. For, as so often emphasized by the Imperial Cancer Research Fund,¹⁵ "immunity to cancer has only been demonstrated against cancer-grafts and the tumours arising from them. The procedures which are effective under these conditions are without effect on spontaneous tumours or analogous grafts of spontaneous tumours. In fact, the cancer immunity referred to depends on the slight biological difference existing between the grafted tumour derived originally from one individual, and the tissues of another individual of the same species as host for these tumour-cells for the time being. So long as a passive transference of the resistant condition from actively immunized animals to fresh individuals, and particularly to spontaneously affected animals, remains an unattained ideal, no application can be made of the knowledge which has been acquired of cancer immunity to the treatment of cancer."

Ewing¹⁶ considers it apparent that immunity to tumours is histioid and cellular, and that it reveals itself in the reactive growth of connective tissue, phagocytosis, and lymphocytic attack on the tumour cells. Serum immunity investigations, he holds, have accomplished practically nothing, "except to show that the malignant tumour process can probably not be controlled by investigations along the lines which have proven effective in bacterial diseases."

Despite the difficulties above implied, the extreme importance of the subject has stimulated American observers to continue their investigations in this direction. The fact that immunity can be induced in animals, under any conditions, gives the nucleus for the hope that, sooner or later, the investigations will reveal the secret of the application of this principle to the production of immunity to cancer in man.

Of interest in this connection are the researches of Murphy and Norton,¹⁷ of the Rockefeller Institute, to determine the effect of X-ray on the resistance to cancer in mice. They found that the chief characteristic of a failing heteroplastic graft in the unsuitable host is a marked local accumulation of lymphocytes. The histological picture was found to be identical with that noted in a failing cancer-

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EARLY DIAGNOSIS.

While an unusual amount of attention has been devoted (chiefly in lectures and printed contributions) to the subject of the early diagnosis of malignant disease, practically no new light has been shed, during the past two years, upon the obscurity which has always enveloped this important field of observation.

The literature of the period under consideration presents a number of contributions to chemical or bio-chemical tests, but none are especially hopeful. The Abderhalden test, which, for a time, was thought a probable solution of the difficulty, has proved disappointing. Levin¹³ and Van Slyke, who have made careful observations in this connection, conclude that the diagnostic value of the Abderhalden reaction in cancer is, to say the least, doubtful, and that, "for the present, the method belongs to the research laboratory and not to the clinic."

A review of the work along the line of the sero-diagnosis of malignant disease furnishes no reason for changing the views which I expressed in 1914: "It is, of course, highly probable that the metabolism is disturbed in cancer, and that the fluids of the body may be different from the normal; such changes, however, if present, must be so subtle as to have escaped observation. Not one of the proposed tests can be relied upon. They are all non-specific and inconstant for cancer. Hence, examination for the purposes of diagnosis is still almost entirely restricted to examination of the tumour or ulcer itself."¹⁴

PREVENTION.

A large part of the experimental work inaugurated or continued during the past two years has had for its object the ultimate discovery of some means of preventing cancer, however remote, at times, this purpose may have seemed.

Immunity.—Most conspicuous, in point of the amount of time and attention devoted to it, and of its importance from a practical application, should such a possibility be realized, is the work on immunity. Unfortunately, the period under discussion has yielded nothing which gives

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matter for interesting speculation and for further research.

Campaign of Education.—While the various lines of laboratory research, looking to the prevention of cancer, have been followed with interesting results from an experimental point of view, nothing has been evolved which may be utilized in the prevention of the disease in human beings. Those who see in errors in diet the beginning and the end of the cancer problem may see, in some of the experimental observations, a verification of their own theories of prevention and cure. But, however significant any such observations may be as indicators for continued research, few will agree that enough of tangible evidence has been brought forward to warrant efforts in the direction of the prevention of cancer through changes in diet or other external conditions. Much less is there any tangible clue, in any of the experimental work to a therapeutic *régime* which, of itself, will eradicate cancer, through prevention or through treatment, once the malignant process is recognized.

From a practical point of view, therefore, we are left with no crutch to lean upon more than that which the campaign of education may furnish. The education of the medical profession in the earlier recognition of the signs and symptoms of cancer, and in the more careful observation of conditions and lesions which may be conducive to cancer has been emphasized in many quarters during the past two years. The education of the public, with reference to the part they must play in the control of this disease, has been made the subject of innumerable lectures, committee meetings, and printed contributions. Such a campaign, *carefully safeguarded*, is, unfortunately, all that may be utilized at present in the effort to prevent cancer.

TREATMENT.

From the therapeutic point of view, nothing epoch-making, either experimentally or clinically, has been evolved during the past two years.

Experimental.—In 1914 Benedict and Lewis¹⁹ published the report of their observations on the cure of malignant tumours in rats by the induction of diabetes with phloridzin. They used forty animals inoculated with the Buffalo-rat sarcoma. These animals were placed on a carbohydrate-free diet, and were injected every second or third day with

graft in an immune animal of the same species. Synchronous with the establishment of the cancer immunity, and during the period in which the lymphocytes are accumulating around the cancer-graft, there is a lymphocytic crisis in the circulating blood, this being observed in actively immunized animals as well as in those possessing a natural immunity, but being totally absent in animals susceptible to the cancer-graft. If this lymphoid crisis be prevented in immune animals by a previous destruction of the lymphoid elements with X-ray, the potentially immune animal is changed to a susceptible one. Leaving out of consideration the complicated question of the direct effect of X-ray on cancer, they studied this artificial method of producing a lymphocytosis in relation to the resistance of mice to their own spontaneous tumours.

In order to do this, they removed the cancer, and then subjected the animal to a stimulating dose of the X-ray. A graft of the original tumour was then immediately replaced in the groin of the animal. The same procedure, with the omission of the X-ray, was carried out in control animals. In other animals, as a further check to the experiments, the cancers were removed and exposed directly to the same amount of X-ray that the animals of the first group had received, a graft of the tumour being then returned to the original host. "An X-ray dose," they found, "which produced a lymphocytosis when administered direct to the animal, was sufficient to render 50 per cent. of the mice so treated immune to a returned graft of their own tumour, and, in the other 50 per cent., greatly to retard the return of the disease. A similar dose of X-ray given to the cancer direct outside of the body did not influence the subsequent growth of a graft of this tumour when returned to its original host." These observers considered that, if this pronounced result could be obtained with one stimulating dose, it is probable that a more pronounced effect might be obtained by a second exposure to X-ray after a suitable interval.

These observations recall the work of Wedd, Morson, and Russ on the production of immunity in mice by radium-irradiated mouse carcinoma.¹⁸

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years, the following deductions, of a practical nature, may be drawn :—

*Ætiology.*⁹—(1) None of the investigations, of either a purely experimental or of a strictly clinical character, have revealed anything concerning the cause of cancer which need give rise to a radical change in the generally accepted views with regard to the treatment of the disease.

(2) The laboratory investigations with regard to heredity should be continued, but it is deplorable that, at this stage of knowledge, this possible factor in ætiology should be brought to bear in the effort to control cancer in the human subject. The advocacy, on the basis of these findings, of the "eugenic control of matings," has already given rise to vastly more mental suffering than is at all warranted by the facts at hand.

(3) Whatever part soil, diet, and other allied factors, may play in the cause of cancer, the findings as published do not warrant the application of deductions therefrom to the "diet plus régime" method of treating cancer, if this is to exclude the early and radical removal, by surgical means, of the cancer.⁹

(4) The findings with reference to the causative effect of prolonged irritation reinforce the view that it is important, wherever possible, to eliminate this factor by rational means.

Early Diagnosis.—The clinician has been given no reliable aid to diagnosis, in the early stages of cancer, by the continued researches with regard to the various "tests" or "reactions."

Prevention.—The education of the medical profession with reference to the earlier and more accurate diagnosis of pre-cancerous and early malignant lesions, of the layman with regard to the avoidance of the sources of chronic irritation and other factors which may be conducive to the development of this disease, together with a hearty co-operation between physician and layman, are emphasized by continued investigation. No definite means of preventing cancer has been developed.

Treatment.—Nothing has been developed which, in any sense, detracts from the rôle of surgery in the treatment of cancer. Diet, hygienic régime, and all adjuvant measures, should be given their proper place as aids, merely, and, in

phloridzin in olive oil, 0.2 gm. being used. All tumours which, at the beginning of the treatment, did not exceed 20×25 mm. in size, underwent rapid and complete disappearance.

Wood and McLean²⁰ later undertook a series of experiments "for the purpose of ascertaining to what extent the results of these investigators (Benedict and Lewis) could be duplicated in large series of animals bearing the tumour with which they had worked, as well as of animals bearing other types of neoplasms." They also treated a case of sarcoma in man with phloridzin, with an unfavourable result. From their observations, they concluded that "any 'cures' obtained in work with the Buffalo-rat sarcoma must be ascribed to spontaneous absorption rather than to the effect of the therapeutic agent."

Benedict,²¹ challenging the findings of Wood and McLean, on the basis of inadequate phloridzination, maintained the position originally taken by himself and his co-worker.

Ewing²² points out that, while all tumours do not react to dietary changes, "the important feature of this work consists in the demonstration that the subject is susceptible of experimental study, and opens up one of the most attractive fields in experimental cancer research." Whether those who attach so much importance to diet, in the management of human cancer, can find, in these observations, any encouragement for the faith that is in them is doubtful; but, as Ewing remarks, it is an attractive field for further investigation.

Clinical.—The strictly practical phase of the treatment of cancer has to offer merely a "report of progress." Investigations have continued with regard to the use of X-rays, thermo-radiotherapy, fulguration, radium, and other physical agents; "autolysin" raised the hopes of some for a time, and then practically disappeared from the horizon, and various minor "fads and fancies" of treatment have received attention at the hands of some, while surgery holds its own, but offers nothing of a distinctly new character.

PRACTICAL DEDUCTIONS.

From the foregoing brief review of some of the lines of investigation, which have been pursued during the past two

years, the following deductions, of a practical nature, may be drawn :—

*Ætiology.*⁹—(1) None of the investigations, of either a purely experimental or of a strictly clinical character, have revealed anything concerning the cause of cancer which need give rise to a radical change in the generally accepted views with regard to the treatment of the disease.

(2) The laboratory investigations with regard to heredity should be continued, but it is deplorable that, at this stage of knowledge, this possible factor in ætiology should be brought to bear in the effort to control cancer in the human subject. The advocacy, on the basis of these findings, of the "eugenic control of matings," has already given rise to vastly more mental suffering than is at all warranted by the facts at hand.

(3) Whatever part soil, diet, and other allied factors, may play in the cause of cancer, the findings as published do not warrant the application of deductions therefrom to the "diet plus régime" method of treating cancer, if this is to exclude the early and radical removal, by surgical means, of the cancer.⁹

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no sense, as substitutes for surgical intervention.

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STRANGULATED HERNIA.*

BY W. SAMPSON HANDLEY, M.S., F.R.C.S.

Surgeon to the Middlesex Hospital, etc.

I PROPOSE to deal with two cases of strangulated hernia which have recently been, and still are, under my care in the wards. I have chosen this subject, because it is of great importance. It is a condition in which the treatment may make the difference between the life and the death of the patient, and in which the responsibility for the treatment may rest entirely upon the general practitioner. A case may be so urgent that he is unable to call in a practised surgeon to help him, so that he has to carry out the treatment himself in its entirety.

The first of these cases is that of a man, aged 78 years, who for 30 years had had a rupture in the left groin. Two days before admission, he was unable to reduce the swelling. The strangulation came on while he was lying in bed. He was suffering from a severe cough, and, no doubt, during an attack of coughing he forced the gut down into the hernia. He was twice sick, and did not subsequently pass flatus or fæces. He noticed that on coughing there was great pain in the swelling. He was admitted, on October 18th, with a normal temperature and a pulse of 96. It will be noted that the pulse rate was very considerably above the normal. There was a swelling in the left groin about the size of an orange: it was well defined and localized, but no fluctuation was obtained in it. That indicates that the swelling was tense. It was situated above Poupart's ligament, and internal to the pubic spine. It was evident, therefore, that the hernia was an inguinal one. There was no impulse on coughing, the swelling was tense. After taxis had been applied for a minute, tension was relieved, but the taxis was not successful, for the swelling could not be reduced. The abdomen was flat, not distended or rigid.

OPERATION.

An oblique incision, about four inches in length, was made in the left groin, in the direction of the inguinal canal, the skin

* Clinical Lecture delivered at Middlesex Hospital.

when taxis was applied to the swelling, the swelling ceased to be tense, and became flaccid. That is very unusual. The reason was the fairly obvious one that the bowel did not plug the neck of the hernial sac sufficiently tightly to prevent the fluid in the sac from flowing back into the peritoneal cavity. In other words, I was able to reduce the fluid, although I could not reduce the hernia.

The question of the employment of taxis in hernia when it is strangulated, that is to say, of manual attempts at reduction, is a rather important one. The trend of opinion at the present day is entirely against the use of taxis. Many surgeons hold that it is wiser, when it is certain that strangulation is present, to give an anæsthetic at once and proceed to operate. But we may be driven to employ taxis, for instance, if one is called to a case of strangulated hernia in a small and dirty cottage, where there are no facilities for operating, it may be safer to employ taxis than to operate. But one must remember not to persist in its use for very long, and not to use much force.

The dangers associated with the employment of taxis are varied, but the most important one is reduction *en masse*. One feels the hernia go back; and we are apt to think we have succeeded in reducing it; but the reduction is not accompanied by any gurgle, such as is generally present when bowel has been returned into the peritoneal cavity. Nor are the symptoms relieved after reduction *en masse*, for the vomiting and other signs of strangulation continue. What has been done has been to force the sac and contents to a position just behind the abdominal muscles, between the muscles and the peritoneum. There is another form of reduction *en masse*, in which the pressure exerted ruptures the neck of the sac, and the intestine passes out between the muscle and the peritoneum through this rupture.

It was noted in the report that the swelling was tense, and that is the most important of the local signs of strangulation in a hernia. It must be remembered particularly that a strangulated hernia is a tense swelling. It is a favourite examination question: What are the local signs of strangulation? Many candidates state that the hernia is irreducible, that there is no impulse on coughing, that it is painful, that it is increased in size; but generally the most

important local sign, the tension, is forgotten.

The abdomen, in this case, was not distended, and it was not rigid. That is the rule in an early strangulated hernia. Generally the obstruction is situated in the small intestine, and we know that in obstruction high up in the intestine there is very little distension, simply because the vessel which contains the fluid—namely, the intestine above the obstruction—is a small one. Moreover, there is no rigidity present in the early stages of strangulated hernia. Abdominal rigidity always means peritonitis of the parietal peritoneum lining the interior of the abdominal wall, and that is absent in strangulated hernia.

The report states that the gut was dark red in colour, but its lustre was preserved. These are not features of an inflamed peritoneum. One of the striking things about strangulated hernia is the absence of signs of inflammation inside the sac. In the case of an inflamed peritoneum, there is loss of lustre and the exuding of a sticky layer of solid butter-like lymph. It is very rare to see lymph or pus within the sac of a strangulated hernia. The reason is obvious; inflammation is a vascular process, depending on a free blood supply, but as the bowel is nipped and its blood supply is cut off, there are no opportunities present for the development of inflammation. Some of the phenomena of strangulation can be watched by winding a handkerchief tightly round the finger. The finger gets more and more dusky, and in time becomes swollen. Still later, if the handkerchief has not been removed, the finger will be found gangrenous, but there will be no inflammation present.

It is the same with strangulated hernia; there is an absence of signs of inflammation inside the sac. If the skin over the finger were as thin as the peritoneum over the strangulated gut, a serous fluid would be seen exuding freely from the finger under the increased pressure. That is what happens in the case of strangulated hernia, and that is why it becomes tense, and why we always find, on opening the sac, that there is a considerable amount of fluid in it. It is an exudation of serous fluid due to the strangulation of the vessels and the consequent venous engorgement. If the strangulation goes on to the stage of gangrene, then, and then only, signs of inflammation appear, not on the bowel,

when taxis was applied to the swelling, the swelling ceased to be tense, and became flaccid. That is very unusual. The reason was the fairly obvious one that the bowel did not plug the neck of the hernial sac sufficiently tightly to prevent the fluid in the sac from flowing back into the peritoneal cavity. In other words, I was able to reduce the fluid, although I could not reduce the hernia.

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The dangers associated with the employment of taxis are varied, but the most important one is reduction *en masse*. One feels the hernia go back; and we are apt to think we have succeeded in reducing it; but the reduction is not accompanied by any gurgle, such as is generally present when bowel has been returned into the peritoneal cavity. Nor are the symptoms relieved after reduction *en masse*, for the vomiting and other signs of strangulation continue. What has been done has been to force the sac and contents to a position just behind the abdominal muscles, between the muscles and the peritoneum. There is another form of reduction *en masse*, in which the pressure exerted ruptures the neck of the sac, and the intestine passes out between the muscle and the peritoneum through this rupture.

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gut are thrombosed, and can be felt as hard cords, it is quite certain that the gut is unreturnable.

Having examined the intestine, we next proceed to divide the constriction. In nearly all cases this must be done from inside the sac; in all inguinal herniæ certainly, because the obstruction is in the wall of the sac itself in the neck. In femoral herniæ, one may sometimes with advantage pass a director outside the sac, between it and Gimbernat's ligament. The hernia-director is flattened, in order to prevent the intestine wrapping round the edges and getting into the groove, where it might be cut. Having passed the hernia-director into the sac, the knife is then pushed along the groove between the director and the sac, and the stricture is divided by a cautious sawing movement, in which the director and knife work as one piece. In the case of an inguinal hernia, the stricture is divided directly upwards, because in that way we cut parallel to the deep epigastric artery, and are not likely to divide it. In the case of a femoral hernia, the stricture is divided directly inwards, because there is found the principal obstacle to the return of the intestine, namely, the sharp edge of Gimbernat's ligament.

When the stricture has been divided, the intestine must not be returned immediately; a very important step must be taken before that is done, namely, to pull down the intestine and inspect the line where it has been nipped by the neck of the sac. This, being the place of maximum pressure, is the situation where perforation is most likely to occur. It is a favourite question to ask which of the layers of the intestine give way first at the neck in strangulated hernia. It is the mucous layer which first gives way, so that, in certain cases, the wall of the intestine, where it is nipped, will be found to consist merely of peritoneum. In some cases, such a weak spot may be sewn over by two or three Lembert stitches. But, if perforation has occurred, it is necessary to take more radical measures.

If, after consideration of the point I have just mentioned, it is decided that the intestine is unreturnable, what is the course to pursue? We have before us the choice of three alternatives. The damaged gut may be left in position, and at the place at which it is damaged, a Paul's tube is tied into it, so as to drain the damaged intestine. That,

but inside the hernial sac, which, it will easily be seen, still retains its blood supply unimpaired, and is, therefore, capable of becoming inflamed. The factor which produces this inflammation of the sac is the escape of bacteria into the interior of the sac through the walls of the damaged gut. When the patient survives long enough for the inflammation to extend from the sac to the subcutaneous tissues, there will be produced a reddening of the overlying skin.

If the question is asked, whether we may expect to find the skin reddened over the seat of a strangulated hernia, the answer is emphatically, "No." It must be remembered that the signs of inflammation are absent in the early stages, and this absence must be associated with the fact that there is no pyrexia. Again, the skin over the hernia is normal in colour, and the abdomen, in all early cases of intestinal obstruction affecting the small bowel, is flat and soft; it is neither distended nor rigid. Further, visible peristalsis through the abdominal wall is absent, because during the short time the strangulation has lasted there has been no time for the occurrence of hypertrophy of the gut. Visible peristalsis is only seen when the obstruction is a chronic one, allowing the intestine above, time to undergo hypertrophy, from the increased amount of work it has to do.

The details of the operation for strangulated hernia must now be considered. One always opens the sac and observes the conditions present in its interior, in order to decide whether the intestine is returnable into the abdomen. The first thing to be noticed is the fluid. Is it odourless and clear? Or, is it blood-stained, or dark and offensive? If the latter, the intestine will be found in an unreturnable condition. Secondly, as to the intestine itself. If it is dark-red, even almost black, but still glistening and shiny, it is returnable. If it is found to be grayish or black in colour, with a dull surface, and of the consistency of soaked blotting-paper—the condition sometimes described as loss of resilience—it must not be returned, because even if not already gangrenous it is certain to become so. There are gradations, and it may be very difficult to be quite sure in a given case whether the intestine is returnable or not. In such cases, it should be treated as non-returnable.

One other point is, that if the vessels on the strangulated

gut are thrombosed, and can be felt as hard cords, it is quite certain that the gut is unreturnable.

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however, is a very primitive device; it leaves the patient with an intestinal fistula, which will be an absolute curse while it exists, and may prove very troublesome to close. Unless absolutely necessary, as, for instance, in a case in which the patient is too ill to stand any prolongation of the operation, this course should not be adopted. In such a case, in the absence of a Paul's tube, the damaged part of the intestine may have to be opened and left in the wound.

The second possibility is resection of the damaged part of the gut, followed by a lateral or an end-to-end anastomosis, with subsequent closure of the gap in the mesentery. The objection to that plan is, that in a patient already suffering from shock, the additional shock caused by this procedure may be very serious, for it must be remembered that a bowel cannot be resected without producing a considerable amount of shock, which, in an old person, may be fatal. Therefore, in my opinion, it is only in rare cases that the method of resecting the gut, when it is unreturnable, should be adopted.

The method I wish to suggest is, to make a lateral anastomosis, a by-pass for the damaged coil:

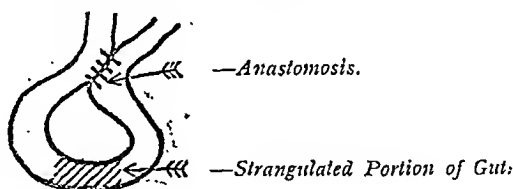


FIG 1.

What, then, is to be done with the gangrenous part of the gut? I advise leaving it in the bottom of the wound, doing nothing else, and *not* sewing up the wound. In the course of two or three days, the gangrenous part of the gut will give way, and we see a hole, from which intestinal contents very likely escape. But this is no longer the main line, the main current of the intestine passes by the anastomosis; consequently, the fistula will very soon close up of itself, and will cause no trouble. As a rule, it will not be necessary to carry out any secondary operation. The operation of lateral anastomosis involves scarcely any shock, and

the slight risk of leakage at the anastomosis is minimized by the safety-valve action of the fistula below it.

The second case was an advanced case of strangulated hernia, in which the gut was unreturnable, and in which I adopted this plan. In many respects, this second case was atypical, and I will point out in what respects it departs from type.

N. W., a female patient, æt. 65, was admitted on the 18th of September for a strangulated hernia. She was quite well up to two weeks ago. She then had a cold, began to feel weak, and was unable to work. About seven days ago she first noticed a lump in her abdomen, and this did not subsequently increase in size. She did not see a doctor until a week after the appearance of the swelling. She then came to the out-patient department, and was admitted to Queen's

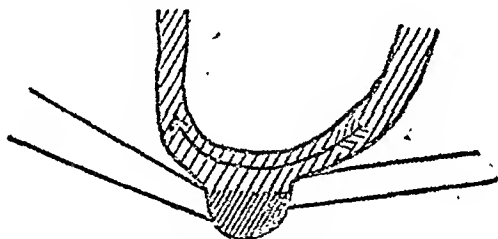


FIG. 2.—*Richter's Hernia.*

ward. She had no pain, no vomiting, and continued to pass flatus. Though the bowel had been constipated she had not complete constipation. It will be noticed that the symptoms were very slow in their development. She had had these signs for a fortnight, though most cases of untreated strangulated hernia would be dead before the lapse of a fortnight. At the operation the explanation was found; she had had a partial strangulated hernia of the kind known as Richter's hernia. In Richter's hernia, the bowel only partially descends into the sac of the hernia, consequently only part of the circumference of the bowel is nipped.

There is still a channel through the rest of the bowel, so that constipation is not complete, and the general symptoms are ambiguous. But the local symptoms enable us to diagnose that, at any rate, strangulation is present. There was a lump in the right iliac fossa, in the region

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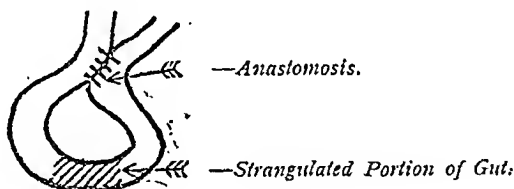


FIG 1.

What, then, is to be done with the gangrenous part of the gut? I advise leaving it in the bottom of the wound, doing nothing else, and *not* sewing up the wound. In the course of two or three days, the gangrenous part of the gut will give way, and we see a hole, from which intestinal contents very likely escape. But this is no longer the main line, the main current of the intestine passes by the anastomosis; consequently, the fistula will very soon close up of itself, and will cause no trouble. As a rule, it will not be necessary to carry out any secondary operation. The operation of lateral anastomosis involves scarcely any shock, and

the slight risk of leakage at the anastomosis is minimized by the safety-valve action of the fistula below it.

The second case was an advanced case of strangulated hernia, in which the gut was unreturnable, and in which I adopted this plan. In many respects, this second case was atypical, and I will point out in what respects it departs from type.

N. W., a female patient, *æt.* 65, was admitted on the 18th of September for a strangulated hernia. She was quite well up to two weeks ago. She then had a cold, began to feel weak, and was unable to work. About seven days ago she first noticed a lump in her abdomen, and this did not subsequently increase in size. She did not see a doctor until a week after the appearance of the swelling. She then came to the out-patient department, and was admitted to Queen's

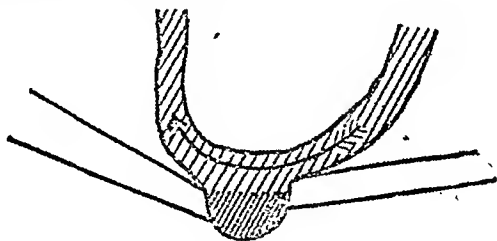


FIG. 2.—*Richter's Hernia.*

ward. She had no pain, no vomiting, and continued to pass flatus. Though the bowel had been constipated she had not complete constipation. It will be noticed that the symptoms were very slow in their development. She had had these signs for a fortnight, though most cases of untreated strangulated hernia would be dead before the lapse of a fortnight. At the operation the explanation was found; she had had a partial strangulated hernia of the kind known as Richter's hernia. In Richter's hernia, the bowel only partially descends into the sac of the hernia, consequently only part of the circumference of the bowel is nipped.

There is still a channel through the rest of the bowel, so that constipation is not complete, and the general symptoms are ambiguous. But the local symptoms enable us to diagnose that, at any rate, strangulation is present. There was a lump in the right iliac fossa, in the region

of the spine of the pubes, of about the size of a walnut. It gave no impulse on coughing, and the note says it was tense and tender, but was not the seat of acute pain. So, on account of the tension and the irreducibility, we concluded definitely that it was strangulated, and accordingly we operated.

I made an incision $3\frac{1}{2}$ inches long, at about the most prominent part of the swelling. It proved to be a femoral hernia. On opening the sac, an ounce of pus escaped. It is most unusual to find pus in the sac of a strangulated hernia. The reason was that owing to the failure of the general symptoms to develop, the local symptoms had had time to reach an unusually advanced degree. Consequently, there was some inflammation in the sac, and it had gone on to the formation of pus. The pus, moreover, was offensive, showing that bacteria had escaped from the interior of the gut. The portion of gut in the sac was found to be greyish-black, in colour. It was covered by a layer of lymph, whitish buttery-looking material, and was obviously unreturnable, and a lateral anastomosis was made as in Fig. 1.

Now the difficulty was to reduce the bowel through the neck of the femoral canal. That difficulty was surmounted by dividing Poupart's ligament upwards, and opening the general peritoneal cavity to the necessary extent. Then the anastomosed gut was pushed back into the peritoneal cavity, leaving the gangrenous portion in the wound. Poupart's ligament was sewn together, and the patient was sent back to bed. For some days she was in a serious condition—she was a feeble old lady—and at night she had attacks of delirium; her temperature rose to 101° , and her condition gave rise to anxiety. These symptoms, however, passed off. After three days she had a faecal discharge from the wound, showing that the gangrenous gut had given way. This discharge was never great in amount, and now—three weeks after the operation—it has ceased, and she gets up and is able to move about. She is to leave the hospital in a few days.

LABYRINTHINE FOCAL INFECTIONS.

By MACLEOD YEARSLEY, F.R.C.S.

Otologist to London County Council Deaf Schools; Late Senior Surgeon to the Royal Ear Hospital, etc.

THE ætiology of sudden attacks of aural vertigo, with or without deafness, has not been understood properly for some time past. Many cases, differing widely in course and result, are dumped together into a "box of all sorts" and labelled "Menière's disease" by those who do not choose to enquire too deeply into their pathology, and are content to treat symptoms. Others, realizing that the term "Menière's disease" should be applied rigidly only to those cases in which hæmorrhage or effusion into the labyrinth has occurred, prefer to describe them more cautiously as cases manifesting Menière's syndrome. But the true nature of many of these cases remains obscure, owing largely to the difficulty of obtaining pathological material for investigation, and in some cases partly, perhaps, to a difficulty in looking further afield than the ear alone for the original cause.

The last decade has, however, seen many pieces of physiological and pathological research, which have tended towards the elucidation of labyrinth disease by the light they have thrown upon the symptoms which arise from disturbance of labyrinthine function. Our present knowledge of injury to the labyrinth; the extension to the labyrinth of suppurative processes in the middle ear; the effects upon the labyrinth of syphilis; and the extension to the labyrinth of meningitis are instances of improved knowledge of the conditions affecting the internal ear. But there has remained a number of cases, in which labyrinthine disease has arisen without any definite general disease or middle ear trouble to account for it. The symptoms in these cases vary from vertigo alone, nerve deafness with or without tinnitus (usually with), or vertigo and deafness. These manifestations, needless to say, vary according to whether a part only or the whole of the labyrinth is affected. When the cochlea alone is affected, nerve deafness and tinnitus arise. Sometimes the deafness is very insidious, and the tinnitus may then be slight or even absent. At times, the deafness progresses by acute attacks, tinnitus

being more marked after each exacerbation. Occasionally the first attack results in permanent and severe—perhaps complete—deafness.

When the vestibular apparatus alone is attacked, disturbances of equilibrium are the chief symptom. These are temporary and follow an acute involvement of the vestibule.

Thus these cases differ considerably clinically; Menière's syndrome is present only when the whole internal ear is involved, partial involvement resulting in symptoms peculiar to the part attacked. As stated above, true Menière's disease should be the term applied only to those cases in which there is a hæmorrhage or effusion into the labyrinth. There can be no suggestion that such a cause is operative in the cases just described.

A light has, however, been thrown on the ætiology of such cases by Shambaugh, of Chicago, in a paper entitled, "Focal Infection in the Etiology of Labyrinth Disease," appearing in the *Annals of Otology*, Vol. XXIV., p. 480. Some of the cases, he points out, are called "essential neuritis," others "chronic progressive labyrinthine deafness"—terms which are destitute of any attempt to suggest the cause of the changes which they essay to describe. With the mind of the true specialist, who looks farther afield than the organ whose maladies he wishes to elucidate, he seeks among diseased conditions elsewhere in the body to find analogies for these labyrinthine degenerations. He recognizes at once the similarity between these phenomena and the chronic degenerations which occur as the result of focal infection. Such chronic degenerations are chronic arthritis and neuritis, chronic nephritis and chronic cardio-vascular changes, the result frequently of chronic latent foci of infection. In all these systemic diseases, there is the chronic progressive character, usually marked by periods of acute exacerbations, accounted for by fresh showers of bacteria discharged from the infective focus into the circulation.

The effect of a latent focus of infection upon the ear is best described in Shambaugh's own words:

"To account for the phenomena observed in many of these cases of internal ear disease as the result of focal infection we have only to assume that the endings of the eighth nerve may be the structure peculiarly susceptible to the bacteria liberated from the infected focus. Each fresh shower of bacteria liberated into the

circulation produces a sudden depression of function, either in the cochlear or vestibular nerve endings, separately or in both simultaneously. With each attack the patient experiences a defect in the hearing, associated with tinnitus aurium, when the cochlea alone is involved, or there is a disturbance of equilibrium with vertigo resulting from the one-sided suppression of labyrinth tonus when the vestibular apparatus is involved. When both the cochlear and vestibular endings are simultaneously affected, we have, as a result, the complete picture of the Menière symptom complex; that is, deafness and tinnitus with vertigo."

Although a single case may be one in which the attack was of sufficient severity to produce total deafness, permanent, and with a tinnitus lasting for years, but of gradually diminishing intensity, most cases show only a partial suppression of function. Vertigo resulting from sudden, complete, unilateral suppression of labyrinth tonus is very pronounced, but rarely lasts more than a few weeks or months. Such cases never show any subsequent attacks, because complete destruction of function has resulted. In partial attacks, vertigo lasts only a few days or weeks, but, if the original focus of infection is not removed, subsequent attacks will occur, ceasing only with complete destruction of function.

The possibility of a systemic infection of the internal ear of focal origin being admitted (and, I must confess, I can see no reason for doubting it), there is a good basis upon which to found treatment which, if not curative, will be at least preventive of further attacks. When, moreover, the occurrence of these systemic infections from latent foci is better realized, preventive treatment of these internal ear and analogous conditions will be better carried out. It is necessary, therefore, to see where the infected foci causing them are most frequently to be found. Shambaugh states that these are usually in the faucial tonsils or in abscesses around the teeth. To these I would add the suggestion that the intestinal tract and the nasal fossæ may be possible sources of infection as well. The latent possibilities of pyorrhœa alveolaris are now well known and, by the majority of practitioners, recognized. The same may be said of the tonsils, although, perhaps, with somewhat less conviction. It is my opinion that the infective tonsil is often passed over in searching for causative conditions. In some cases, the patient voluntarily reports the occurrence of recurring attacks of sore

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throat, and, if the throat be examined during such an attack, the latter will be seen to be a mild tonsillitis. Such a history, with added recurring attacks of "rheumatism," is noteworthy in one of the cases which I shall presently relate. But histories of "sore throat" may be absent, and yet examination will reveal evidence of an infected tonsil. Such tonsils may be large, and inspissated pus may be expressed from them, but often they are shrunken and small; very frequently, the tonsillar fossa will be found to be deep and undrained.

The following cases illustrate the foregoing remarks:—

CASE 1.—A physician, aged 56, found himself becoming slightly deaf in the right ear, early in 1915. He consulted an otologist, who assured him he could find nothing wrong. Six months later he was worse, and experienced an attack of violent vertigo, with vomiting, which lasted 24 hours. After the first attack he had others, averaging one every three weeks. There was singing tinnitus, not of an annoying character, and not worse before an attack. During his vertigo he tended to go to the right, but there was no apparent movement of objects. Four and a half years previously, he had blood poisoning from a post-mortem wound, which was followed for three years by occasional carbuncles. He was the subject of chronic constipation. On examination, both tympanic membranes were slightly dull and thickened. There was chronic pharyngitis, and the nasal septum showed an acute deflection to the left, the concavity forming a narrow chink on the right, containing inspissated secretions. Functional tests gave a positive Rinne reaction in both ears. Bone conduction to a 35 sec. fork was R. 17 secs., L. 22 secs. The lower tone limit was R. 2 C. 32, L. 3 C. 16. The Edelmann-Galton whistle showed the upper tone limit to be R. 12,000, L. 18,000, double vibrations. He was advised that the probable source of infection lay in the nose, but that habitual constipation might also be a cause. He elected to have treatment for the latter; but the attacks of vertigo continuing (he experienced his worst attack 14 days after the consultation) he decided to have a submucous resection of the nasal septum performed. This was done at Easter, 1916, and he has had no vertigo since. Seen recently, the general condition of health was much better, but the tinnitus and deafness remained the same. The bone conduction to the 35 sec. fork was, however, now R. 21 secs., L. 25 secs., the lower tone and upper tone limits in the right ear being respectively 3 C. 16 and 15,000 double vibrations.

CASE 2.—A lady, aged 49, had an attack of "influenza" 14 days before Easter, being confined to her bed for two days. On recovery, she went to Harrogate, and benefited by the change. On June 8, she became suddenly deaf in the left ear with hissing tinnitus, at 8.30 p.m., which she ascribed to motoring in a very cold wind. She retired to bed at 10 and slept until 6, when she woke feeling "that everything was spinning round"; she did not, however, note any

special direction. She struggled to her maid's room and sent for assistance. She experienced nausea, but no vomiting, and this passed off on returning to bed. She could not, however, lie on her left side. Having been subject to accumulations of wax, her ear was syringed, without result. She remained in bed two days, and the vertigo gradually passed off. She got up at 10.30 on the third day and dressed, but passed a week on a couch because, as she put it, she "longed to lie down." She then saw an otologist, who, Politzerized her, and gave a bad prognosis as regarded her hearing, which, he told her, was due to "nerve deafness." She then took 5 grs. of calomel in hourly doses of gr. i, followed by a saline. This treatment appears to have upset her, as she developed "heart attacks," and passed another five weeks in bed.

Three weeks were spent in a nursing home, where she had general massage. A second otologist Politzerized her. She then got an attack of laryngitis, with gout in the toe, and was put on potass. iodid. for a few days. The heart attacks recurred after three weeks, and, 10 days later, she went to Scarborough for a fortnight, where she greatly improved. On her way home, she saw Dr. Rutherford, of Harrogate, who reported her free of any intestinal trouble. This was done at my request, as she was shortly to consult me. I saw her first on October 5, 1916, when she stated she was very deaf in the left ear, with tinnitus of a gentle, even, blowing character, not pulsating. This was varied by an occasional "mouse squeak." There was no vertigo and no titubation. She volunteered that she had always been subject to "sore throat." She had suffered at 20 from lead poisoning.

On examination, the tympanic membranes were normal in texture, but the light reflex was broken in the left. The nares were narrow, but there was no deviation of the septum or obstruction. The tonsils were septic, especially the left, which had a deep supra-tonsillar fossa. A probe passed into this gave a sour odour. Functional tests gave the following results: Rinne, positive on both sides. Bone conduction to the 35 sec. fork, R. 29 secs., L. 14 secs.; lower tone limit, R. 3 C. 16, L. 2 C. 32; upper tone limit, R. 20,000, L. 17,000 double vibrations; no nystagmus; Romberg, negative; knee jerks brisk.

In the face of these functional reactions, it was difficult to see the reason for Politzerization. I came to the conclusion that the attack was almost entirely confined to the vestibular apparatus, and that the deafness might be due largely to shock. I gave a guarded prognosis, and enucleated the tonsils on October 17; these were small and septic, the left one containing several purulent foci. On November 10, the reactions of the left ear were: Bone conduction to the 35 sec. fork, 19 secs.; lower tone limit, 2 C. 32; upper tone limit, 18,000 double vibrations.

CASE 3.—A gentleman, aged 56, complained of deafness, with tinnitus of rushing and bell-like character, and a sense of fullness in the head. This had lasted for about two years, varying in intensity. For the past year, attacks of vertigo, with nausea, had occurred, especially after extra close application to work. Engaged

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in a harassing business, in which he had largely to depend upon his own exertions, he had taken no holiday, or even rest, for over 10 years. He took no exercise and had no hobbies. His tympanic membranes were thickened but not indrawn. His nose showed no obstruction, although the nasal mucosa was dusky and "sticky." There was considerable chronic pharyngitis, which was not surprising from the very pronounced and offensive pyorrhœa present. He looked much older than his years, and presented the yellow, unhealthy complexion of chronic septic absorption. His functional tests were as follows: Rinne pos. in both ears; bone conduction, R. 0, L. 20 secs.; lower tone limit, R. and L., 1 C. 64; upper tone limit, R. and L., 45,000 double vibrations. I saw this case some 12 years ago, and did not realize then its precise nature, although I recognized its labyrinthine character and the fact that it was probably connected with the horribly septic condition of his teeth. My advice was to take a long holiday and see a dental surgeon. Neither were carried out, and he grew worse, until a particularly severe attack of vertigo about a year later brought him back to me, and he consented to dental treatment. Cured of pyorrhœa, he remained deaf, but had no further attacks of vertigo.

The next case is one in which the sudden complete deafness was probably the result of an attack affecting the cochlea alone:

CASE 4.—A gentleman, aged 62, had been partially deaf for some 20 years or more, from catarrhal causes. During that time he had run the gamut of most celebrated otologists and many of the notorious quacks. He had been able to retain a certain amount of useful hearing, enough to allow him to play a wind instrument and enter with enjoyment into music. Suddenly one evening, whilst playing bridge, he became "stone" deaf, and had remained so for three months. On examination, his tympanic membranes were indrawn and thickened peripherally. His nasal septum was very irregular, and the electric nasopharyngoscope showed large posterior ends and much chronic swelling round the Eustachian openings. Chronic pharyngitis; tonsils not affected. Functional tests gave: Bone conduction, R. and L., 0; lower tone limit, R. and L., C. 1024; upper tone limit, R. 5524·15, L. 9290·48 double vibrations.

This patient suffered from obstinate constipation, and showed signs of chronic toxæmia. His condition was probably analogous to that of Case 1, although the attacks were different, but the patient's age made one hesitate to suggest nasal operation, and his complete deafness had lasted too long to expect a good result. Treatment for constipation was therefore urged, but probably not taken, and the case was lost sight of.

The four cases given above are all instructive. Further comment is scarcely needed, since the lesson they teach is obvious.

THE TRANSFUSION OF BLOOD WITH REFERENCE TO PERNICIOUS ANÆMIA.

By O. LEYTON, M.D., D.Sc., F.R.C.P.

Physician to the London Hospital.

"I KNOW NOT FLESH IS HOLIER THAN FLESH,
NOR BLOOD THAN BLOOD MORE CHOICELY QUALIFIED,
THAT SCORN SHOULD LIVE BETWEEN THEM."¹

THE assumption that these lines express a biological fact may have been responsible for the loss of several lives.

Moss,² in 1910, showed that the bloods of human beings might be divided into four groups, depending upon the presence of agglutinins and hæmolysins, and suggested that the untoward results, which followed occasionally the transfusion of blood, might be due to the donor belonging to a different class to the patient.

Based upon 1,600 tests, Moss found that all might be included in one of the following groups:—

- Group 1.*—Sera agglutinate no corpuscles.
Corpuscles agglutinated by sera of Groups 2,
3 and 4.
- Group 2.*—Sera agglutinate corpuscles of Groups 1 and 3.
Corpuscles agglutinated by sera of Groups 3
and 4.
- Group 3.*—Sera agglutinate corpuscles of Groups 1 and 2.
Corpuscle agglutinated by sera of Groups 2
and 4.
- Groups 4.*—Sera agglutinate corpuscles of Groups 1, 2
and 3.
Corpuscles not agglutinated by any sera.

The hæmolysins seemed to correspond to the agglutinins, but not without exceptions.

The results of several observers show that the percentage of individuals belonging to each class seem to be the same in different districts. Moss found Group 1, 10 per cent.; Group 2, 40 per cent.; Group 3, 7 per cent.;

in a harassing business, in which he had largely to depend upon his own exertions, he had taken no holiday, or even rest, for over 10 years. He took no exercise and had no hobbies. His tympanic membranes were thickened but not indrawn. His nose showed no obstruction, although the nasal mucosa was dusky and "sticky." There was considerable chronic pharyngitis, which was not surprising from the very pronounced and offensive pyorrhœa present. He looked much older than his years, and presented the yellow, unhealthy complexion of chronic septic absorption. His functional tests were as follows: Rinne pos. in both ears; bone conduction, R. 0, L. 20 secs.; lower tone limit, R. and L., 1 C. 64; upper tone limit, R. and L., 45,000 double vibrations. I saw this case some 12 years ago, and did not realize then its precise nature, although I recognized its labyrinthine character and the fact that it was probably connected with the horribly septic condition of his teeth. My advice was to take a long holiday and see a dental surgeon. Neither were carried out, and he grew worse, until a particularly severe attack of vertigo about a year later brought him back to me, and he consented to dental treatment. Cured of pyorrhœa, he remained deaf, but had no further attacks of vertigo.

The next case is one in which the sudden complete deafness was probably the result of an attack affecting the cochlea alone:

CASE 4.—A gentleman, aged 62, had been partially deaf for some 20 years or more, from catarrhal causes. During that time he had run the gamut of most celebrated otologists and many of the notorious quacks. He had been able to retain a certain amount of useful hearing, enough to allow him to play a wind instrument and enter with enjoyment into music. Suddenly one evening, whilst playing bridge, he became "stone" deaf, and had remained so for three months. On examination, his tympanic membranes were indrawn and thickened peripherally. His nasal septum was very irregular, and the electric nasopharyngoscope showed large posterior ends and much chronic swelling round the Eustachian openings. Chronic pharyngitis; tonsils not affected. Functional tests gave: Bone conduction, R. and L., 0; lower tone limit, R. and L., C. 1024; upper tone limit, R. 5524·15, L. 9290·48 double vibrations.

This patient suffered from obstinate constipation, and showed signs of chronic toxæmia. His condition was probably analogous to that of Case 1, although the attacks were different, but the patient's age made one hesitate to suggest nasal operation, and his complete deafness had lasted too long to expect a good result. Treatment for constipation was therefore urged, but probably not taken, and the case was lost sight of.

The four cases given above are all instructive. Further comment is scarcely needed, since the lesson they teach is obvious.

of the erythræmic patient might contain a substance, which would stimulate the production of red cells.

After explaining to the patient that there was a certain risk in injecting the blood, and having obtained his consent, I injected one ounce of blood. The transfusion was stopped after this small amount had been injected, because the patient complained of severe cramp-like pains all over him. These pains lasted ten minutes, and then all symptoms disappeared. Examination of the blood after a day or two demonstrated a considerable improvement. The patient asserted that he felt better, and asked for a further injection in spite of the discomfort of the first. On the second occasion three ounces of blood were injected, with the recurrence of the former symptoms, which were of a more severe type, and accompanied by vomiting and palpitation of the heart. For a time the symptoms were sufficiently alarming to cause anxiety. This injection was not followed by any benefit.

In the light of Moss's paper, there can be but little doubt that the corpuscles of the erythræmic patient were agglutinated by the plasma of the case of pernicious anæmia, and the symptoms which, in many respects, simulated those of caisson disease, were due to temporary obstruction of some of the smaller blood vessels supplying the central nervous system. The patient left the hospital some months later, in the same condition as he had entered it.

This want of success made me postpone further treatment with blood. In September, 1916, my interest was re-awakened by McClure's paper recording the results of massive injections of human blood in 17 cases of pernicious anæmia. Having a severe case under my care, I persuaded him to submit to the treatment. Donors were obtained without difficulty, eight of the students at the London Hospital Medical College volunteered, and of these five had suitable blood. It is with much pleasure that I record the fact that the majority of those who gave their blood did so only to benefit a sufferer, and handed over to charity the gift which had been offered by the patient.

The technique of transfusion from vein to vein by means of many syringes is quite convenient, and reduces the procedure from a surgical operation to a medical

Group 4, 43 per cent. McClure³ found 8 per cent., 36 per cent., 9 per cent. and 47 per cent., whilst Brem⁴ states the percentages belonging to the four groups are 10:40:7:43. These numbers show that if the patient happens to belong to Group 1 or Group 3 there may be considerable difficulty in obtaining a suitable donor if we assume that the donor must belong to the same group as the patient.

If the intention is to carry out only a few transfusions, perhaps the following method of selecting suitable donors is as convenient as any. Five drops of blood are taken from the patient and allowed to coagulate in a glass capsule. Two drops of blood from each of the proposed donors are collected in separate tubes, each tube containing one cubic centimetre of an aqueous solution of 0.8 per cent. sodium chloride and 1.5 per cent. sodium citrate. Two loopfuls of the serum of the patient are mixed with one loopful of red corpuscle emulsion, and examined under the low power of a microscope as a hanging drop preparation. If agglutination occurs within half-an-hour, the donor from whom the red cells were taken is not suitable for the patient. With the serum from the five drops of blood, several suggested donors may be examined.

Further tests should be carried out to decide whether any hæmolysis will occur.⁵ Five drops of blood of the patient are mixed with one drop of 10 per cent. solution of sodium citrate. A similar mixture of the donor's blood is prepared. Three coarse capillary tubes are filled (1) with equal parts of the citrated bloods of patient and donor; (2) with ten parts of patient's citrated blood and one of donor's; (3) ten parts of donor's citrated blood and one part of patient's. These tubes are sealed, and then kept at 37° C. for half an hour. If neither hæmolysis nor agglutination has occurred in any of the tubes after half an hour, the patient may be transfused with that blood.

About three years ago, a severe case of pernicious anæmia, which had failed to improve upon any form of arsenic, was under my care in hospital, whilst quite close to him was a case of erythræmia. It seemed as if Providence were inviting me to inject into the case of pernicious anæmia some of the blood from the case of erythræmia. I thought that it was within the limits of possibility that the blood

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occurs is in the needles. To meet this difficulty, a double needle is used, and the inner cannula removed when blood has clotted in it. Clearing the cannula with a stilette, and then replacing it is almost useless, because a fresh clot forms very rapidly; a fresh cannula well coated with liquid paraffin should be used, and, if necessary, a third and fourth. This clotting will occur in the needle in the vein of the donor as well as in that of the patient. No attempt should be made to clear a needle when the clot from it would pass into a vein.

Every precaution must be used to prevent injecting either air or liquid paraffin into the patient. Probably the latter would prove the more deadly.

Everything which can be sterilized by boiling is dealt with in that way, except the needles; they are heated in liquid paraffin.

The syringes, with their tubes and nozzles, are rinsed out with liquid paraffin, and all excess is drained away. The tubes and nozzles are then filled with the sodium citrate solution.

The armlets are applied to the upper arms of patient and donor. These must be applied very loosely, so that when uninflated, they do not compress the arm in any way.

The flexor surfaces of the elbows are painted with iodine. The armlets are inflated, and the needles inserted into suitable veins. Whilst the first syringe is being filled with blood, normal saline is allowed to flow into the patient. The filled syringe is disconnected from the cannula, which has been placed in the needle in the donor's vein, and handed to the operator, who, after having expelled any air which may be in the tube of the syringe, connects it to the cannula, passing to the patient.

The blood is injected into the patient at the same rate as it is withdrawn from the donor, so that the time during which the blood remains stationary in the needles shall be reduced to a minimum. If any hitch occurs, the interval is filled by injecting saline into donor or patient.

After the syringe has been emptied, it is washed most thoroughly in order to free it from any fibrin ferment and then the tube attached to it is filled with sodium citrate solution and placed handy for the operator, who is filling

séance. One must remember that any error in the technique may be followed by a fatal result. It should not be entered upon light-heartedly, except by those who have had considerable experience of intravenous injections, and are well acquainted with the physiological teachings about clotting of blood.

The apparatus and solutions required are:—

Six all glass 20 cc. syringes. To the nozzles of these pieces of thick-walled rubber tubing are fixed. The lumen of the tube should be such that ten centimetres in length has a capacity of one cubic centimetre. To the end of these tubes, nozzles are fixed which will fit the needles.

A selection of hollow needles, the lumina of which are considerably greater than that of an exploring needle, with so-called "intravenous points." Each of these needles is fitted with a series of cannulæ, blunt ended and of a length to project just beyond the point of the needle.

Two armlets similar to those used with a Riva Rocci blood-pressure apparatus; perhaps the washable form, suggested by Vernon, is the most convenient.

Two vessels to contain normal saline, fitted with tubes, to which nozzles to fit the needles are attached. The tubes from these vessels should be controlled with "single-handed" clips.

Sterile normal saline made with quite recently distilled water.

A solution of sodium citrate, 5 per cent., in half strength normal saline.

Liquid paraffin.

Tincture of iodine.

Sterile towels, gauze, etc.

Very large quantities of sterile water.

Before describing the actual details of the procedure, it will be wise to explain why this elaborate apparatus is required.

The one and only difficulty one has to contend with is clotting of blood, and the place where this most frequently

occurs is in the needles. To meet this difficulty, a double needle is used, and the inner cannula removed when blood has clotted in it. Clearing the cannula with a stilette, and then replacing it is almost useless, because a fresh clot forms very rapidly; a fresh cannula well coated with liquid paraffin should be used, and, if necessary, a third and fourth. This clotting will occur in the needle in the vein of the donor as well as in that of the patient. No attempt should be made to clear a needle when the clot from it would pass into a vein.

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the syringes.

When the blood in a cannula clots, the cannula is replaced by another. The transference of 600 cc. of blood can be carried out quite rapidly. It is well to remember that sodium citrate in large quantities seems to be a poison, and unlimited amounts must not be injected.

Even with perfectly-matched bloods, reactions may occur. After the first injection of 400 cc. of blood the patient had a severe rigor, lasting several hours. The temperature rose to 102 F., whilst severe pains in the abdomen were complained of.

Thinking that these symptoms presented a similarity to anaphylaxis, it seemed wise to try the drug which Professor Leyton⁶ and Dr. Helen Leyton had found prevented or diminished anaphylactic shock.

Half an hour before the injection I have given one hundred and fiftieth of a grain of hyoscine methyl bromide, along with a sixth of a grain of morphine. This treatment has prevented the uncomfortable symptoms.

The only conclusions I am able to draw at present are (1) that a considerable quantity of blood can be transferred without surgical assistance; (2) that improvement occurs after some of the injections of blood.⁷

Pernicious anæmia follows so variable a course that it may be years before definite conclusions can be arrived at, but, for the present, massive transfusions of blood offer the greatest chance of improvement.

REFERENCES.

¹ Sir Henry Norman quoted these lines during conversation about transfusion of blood. I wish to thank him.

² Moss, W. L.: *Bulletin of the Johns Hopkins Hospital*, 1910, p. 63.

³ McClure, Roy. D.: *Jour. Amer. Med. Assoc.*, September 9, 1916.

⁴ Brem, Walter V.: *Jour. Amer. Med. Assoc.*, July 15, 1916, p. 190.

⁵ Weil, Richard: *Jour. Amer. Med. Assoc.*, January 30, 1915, p. 425.

⁶ Leyton, A. S., and Dr. Helen Leyton: *Lancet*, 1916, p. 1171.

⁷ A case of pernicious anæmia, which appeared to many to be moribund, is now convalescent after 14 transfusions.



THE INHERITANCE OF NORMAL AND PATHOLOGICAL TRAITS IN MAN.

By H. DRINKWATER, M.D., F.R.S.E., F.L.S., ETC.

Wrexham.

THE whole path that medicine has traversed has been conspicuously marked by theories, some of which may have been helpful, whilst others have certainly had a retarding influence. The post-Hippocratic Greek and the Græco-Roman physicians were positively chained by their various and conflicting theories. The schools of the Dogmatists¹ the Empirics and Methodists, the Pneumatists and Eclectics, successively held a dominating influence, and, afterwards, the Galenists ruled for about fifteen centuries. Since then a great change has come over medicine.

It is not yet free from theory, and probably never will, nor indeed can, be; but the great distinguishing feature of modern medicine is the desire for, and the appreciation of, facts.

A start was made by Vesalius (1514-1564), and an immense impulse was given by Harvey (1578-1657). A theory is now regarded, not so much as an explanation, but as a tool, the value of which is judged by its power to do work. No matter how fascinating in appearance, if it does not answer the requirements, it must be rejected.

The aim is not to make facts fit some theory, but to adopt a theory which conforms to phenomena. Hence it follows that medicine is becoming less bound by the authority of tradition, and, though it has not yet cast off all its fetters, it may be said to have adopted the golden rule of Huxley²: "Give unqualified assent to no propositions but those the truth of which is so clear and distinct that they

¹ Dogmatists.—Founded by Thessalus and Draco, two sons of Hippocrates, who were physicians to the Macedonian Court about 400 B.C. Empirics.—About 280-117 B.C. Serapion was the chief representative. Methodists.—Founded by Themison, of Laodicia, a pupil of Asclepiades, about the beginning of the Christian Era. Pneumatists.—Founded by Athenaios, of Attala, First Century. Eclectics.—So named by Agathinos, First Century.

² *Lay Sermons*, etc., p. 121. 1874

cannot be doubted." These remarks are specially applicable to the subject of the *Ætiology of Disease*, the knowledge of which has recently made such phenomenal progress.

A branch of biology which, of late years, has advanced so rapidly that it is practically a new science, is *Heredity*, which will here be considered in its special relation to normal and pathological traits in man.

In its broad outlines, it has long been recognized; it has been common knowledge that "like produces like," but no one could say why offspring resemble their parents, nor why they differ from them, for often "like" produces "unlike." (Fig. 2.)

It has long been known that certain human traits are inherited, but the laws of heredity, if there be any laws, seemed to be so erratic in their manifestations that they eluded detection, and, therefore, could not be formulated.

Thanks to the labours of recent and living investigators, so much knowledge of the subject has now been acquired, that heredity has taken its place as a definite branch of science.

Just as the geologist, the physicist, and the astronomer have shown us that Nature works in a perfectly orderly manner in the inorganic world, so the biologist is arriving at the conviction that equally definite laws exist throughout the realm of organic Nature.

During the last few years, many biologists have been industriously collecting data and making experiments, with the view of discovering how heredity works, with the conviction that it operates with strict uniformity under similar conditions. They have discovered some important laws through experiments and observations on plants and the lower animals. Man is not a convenient subject for experiment, but, from observation, it is found that essentially the same laws which hold true in plants and the lower animals can be enunciated as applicable to man also. This is of interest to physicians.

If heredity acts in man according to definite fixed laws, is it not the duty of the physician to endeavour to discover these laws, especially if they will sometimes explain the incidence of diseases and abnormalities which cannot otherwise be accounted for?

There is probably no class of the community which has

such good and such frequent opportunities of making the desired observations as medical practitioners. Unfortunately, one not infrequently meets with a published account of some hereditary trait, which is so imperfectly given that the record is valueless and sometimes positively misleading. It would be easy to quote examples, but it is not necessary.

Many recorders fail to appreciate the importance, in genealogies intended to illustrate laws of inheritance, of including normals as well as abnormals. Every member of the family should be included in the record, and the character of each indicated.

Merely to enumerate the abnormals will throw little light on heredity, and three generations at least must be shown. (Fig. 7, page 263.)

The general practitioner of medicine, who may have no time for experimental work, may, nevertheless, with little trouble, make observations of great importance in connection with disease and physical and mental peculiarities which are continually coming under his care. As a matter of fact, much of the work on human inheritance has been done by members of the medical profession.

The study of heredity received a tremendous impulse from the work of the Austrian priest, Gregor Mendel, who published the account of his epoch-making experiments, and his theories founded thereon in 1865 (47).¹ He enunciated certain laws which were quite new to science; but no one appreciated their importance until about the end of last century, when De Vries (70), Correns (9), and Tschermak (68), who happened to be attracted to the same line of research, studied and made known Mendel's work. Then, in 1902, Bateson published an English translation of Mendel's original papers (1).

Mendel's theory is now termed "Mendelism." To appreciate it one must compare it with the idea with regard to heredity, which prevailed when Mendel carried out his experiments, and, indeed, for many years afterwards.

The general opinion was that the controlling influence is exercised by the body (the soma), as distinguished from the reproductive germinal elements, and that *heritable characters*

¹ The numbers in parentheses refer to the bibliography in the Appendix to this paper.

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feres with expected results. These apparent anomalies may be cleared up by further observations and records; therefore, still more records are wanted, and medical men may supply them.

A case may be trivial in itself, and yet it may serve to elucidate and establish some law of great importance.

Charles B. Davenport (11, p. IV., preface) accuses the medical profession of being responsible for the loss of appreciation of the power of heredity. He says, "It has had its attention too exclusively focussed on germs and conditions of life. It has neglected the personal element which helps to determine the course of every disease. It has forgotten the fundamental fact that all men are created bound by their protoplasmic make-up, and *unequal* in their power and responsibilities."

A man's environment, the conditions under which he lives, his food, clothing, occupation, etc., exert a great influence upon his physical and mental development and activities, and his general health. Very careful attention has been paid by physicians to the consideration of this influence, and to measures which promise amelioration; but it has not been recognized sufficiently that the reaction of the human body to external influences depends very largely upon the conditions of the body itself, its "constitution," *i.e.*, its inborn inherited potentiality.

It has been stated¹ that practically everyone in this country over 35 years of age has been attacked by the tubercle bacillus, but with what different results! As a rule, the bacillus is beaten in the fight, and the human body shows no appreciable signs of the conflict during life, and only after death is it discovered that there has been a battle. In other instances, the bacillus gains an easy victory. What is the cause of this wide difference? In one case, the individual was born with tissues that were comparatively resistant to tubercle; in the other case, he was born with tissues that were highly susceptible.

In both, the condition was inborn and hereditary. This

¹ *The Conquest of Consumption*, by Arthur Latham, M.D., and Ch. H. Garland, p. 31. Fisher Unwin, 1911. Bulloch, *Treas. of Human Inher.*, Part 1, p. 19, where he refers to observations of Nägeli, Burckhardt and Schenker.

are conveyed by the body cells into the germ cells. Darwin's theory of Pangenesis, published in 1868, was a suggestion as to how this was effected.

In 1892, Weismann (72) announced his germ-plasm theory, according to which the *germ cells of one generation are derived directly from those of the preceding generation, and are the sole inheritors and transmitters of somatic characters*, the body being simply the container of these essential hereditary elements.

Thence it followed that the real question was not: "how do the characters of the organism get into the germ cells which it produces, but how are the characters of the organism represented in the germ cells which produce it?" (10, p. 88.)

Mendel's work goes far to support the theory of Weismann. Both attempt to explain the observed phenomena of inheritance by reference solely to the contents or constitution of the germ cells, and leave the body or somatic cells out of account.

Mendel's experiments were, perhaps, not of much importance in themselves, but the *laws* which they enabled him to formulate were so important that they have served as the guide and stimulus to experimental biologists throughout the world for the last fifteen years. Further theories have been propounded in conformity which added knowledge of facts, but they are only supplementary to those propounded by Mendel.

Mendelism has revealed, more than any other theory, the essential constitution of living beings. It has shown breeders what results they may expect, and in certain cases, how these results may be obtained.

It has already been stated that many human traits, normal and pathological, are hereditary; several of them have been shown to be inherited according to Mendel's laws. Frequently, however, one meets with exceptions—cases which do not conform and the cause is obscure. It may be that some undiscovered law is interfering with the manifestations of the known law. When an apple is detached from the tree, gravitation may cause it to fall to the ground, or the apple may be intercepted by the hand; yet, although it does not reach the ground, gravitation is still pulling on it and giving it weight. In obscure cases of inheritance, it is probably some invisible intercepting agency which inter-

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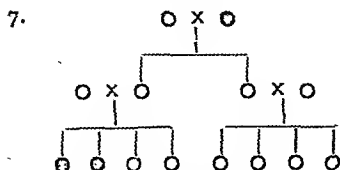
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Mendel's experiments were, perhaps, not of much importance in themselves, but the *laws* which they enabled him to formulate were so important that they have served as the guide and stimulus to experimental biologists throughout the world for the last fifteen years. Further theories have been propounded in conformity which added knowledge of facts, but they are only supplementary to those propounded by Mendel.

Mendelism has revealed, more than any other theory, the essential constitution of living beings. It has shown breeders what results they may expect, and in certain cases, how these results may be obtained.

It has already been stated that many human traits, normal and pathological, are hereditary; several of them have been shown to be inherited according to Mendel's laws. Frequently, however, one meets with exceptions—cases which do not conform and the cause is obscure. It may be that some undiscovered law is interfering with the manifestations of the known law. When an apple is detached from the tree, gravitation may cause it to fall to the ground, or the apple may be intercepted by the hand; yet, although it does not reach the ground, gravitation is still pulling on it and giving it weight. In obscure cases of inheritance, it is probably some invisible intercepting agency which inter-



7. A black and a white produce two whites each of whom marries a white, one of whom has two whites, and two blacks, and the other has four white offspring.

Thus the children may resemble the parents or may differ from them. Are these results merely haphazard, or do they appear in accordance with some definite law? Many of the results would be quite unexpected by breeders, who would be unable to offer any explanation beyond the convenient harbour of refuge known as "reversion" or "atavism." It is such cases as these that have received elucidation from Mendel's work.

It may be laid down as a general rule, that where the results are unexpected, it is because the appearance of the parents disguises their genetic (germinal) constitution.

What may be called Mendel's key, in the form of a pedigree chart, is shown on page 269. It is best understood by following the experiments on which it has been constructed. Mendel's plan (47) was very simple (but also laborious). It consisted in producing hybrids by artificial cross-fertilization of certain plants.

The seeds as collected were kept separate, and so labelled that he always knew the parentage of each plant produced. The importance of this procedure will shortly be seen.

His principal material was the edible garden pea. He was struck by the variations of this plant; some being tall, some dwarf, some have coloured flowers, and some have white, etc. He wished to know the cause of these differences, and, with this object, he *crossed* two plants strongly contrasted in one particular feature, such as stature.

EXPERIMENT 1.—He crossed a pure-bred tall with a pure-bred dwarf (such as the "cupid" variety, which only grows to a height of a few inches). All the resulting hybrids were tall plants. No dwarfs appeared, and no intermediate forms. As this was the invariable result, he called tallness "Dominant" (D) and dwarfness "Recessive" (R) in peas.

The result is represented thus:—

Tall	×	Dwarf	D	×	R	} Though the parents differ, the offspring are all alike (as in the human inheritance shown in Fig. 3).
I	=	I				
Talls		D				

EXPERIMENT 2.—Mendel next allowed these tall hybrids to become self-fertilized (natural process), and found that both types of

difference in susceptibility to disease is very conspicuous in the lower animals—dogs, for example.

Man is the product of his *heritage* and his *environment*, and these two contributors should be distinguished as far as possible. There is his nature and his nurture; the former is frequently the more powerful of the two.¹

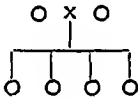
His nurture can be, and often is, modified from time to time, for better or worse; *his nature is unalterable*.²

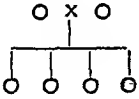
Man's inheritance is his stock-in-trade that constitutes his birthright.

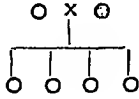
The following diagrams show some of the commonest types of inheritance.

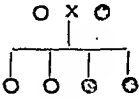
Let a black circle represent an individual showing some particular trait (generally the one under investigation), and a white circle the absence of this trait, in either sex.

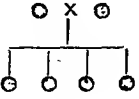
Assume that four children result from the mating of two individuals, then the following results are to be met with:—

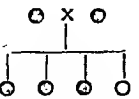
1.  1. Two whites (who may be taken as normals) have four normal children = four whites.

2.  2. Two whites produce three whites and one black, who may be considered as an abnormal.

3.  3. A white and black produce four whites.

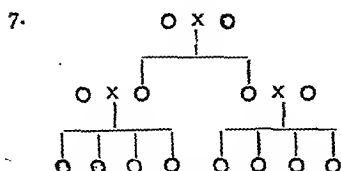
4.  4. A white and black may produce two whites and two blacks.

5.  5. Two blacks may produce four blacks.

6.  6. Two blacks produce three blacks and one white.

¹ Karl Pearson says it is as 10 to 1. *Eugenic Review*, April, 1916. p. 53.

² That is, so far as the individual is concerned.



7. A black and a white produce two whites each of whom marries a white, one of whom has two whites, and two blacks, and the other has four white offspring.

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The original pure-bred tall always breed true; they produce tall only. The dwarfs always breed true to dwarfness, whatever their parentage.

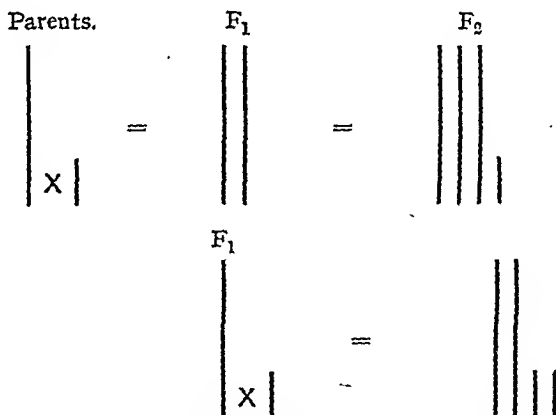


FIG. 8.—Diagram to illustrate Mendel's three experiments referred to in the text.

These experiments are of great interest from several points of view.

1. They show that to discover the laws of inheritance, three generations at least must be included.
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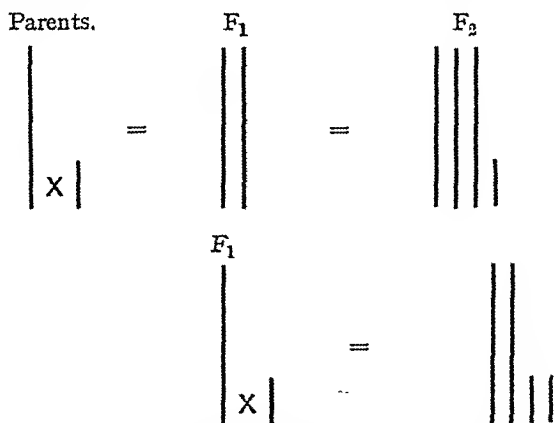


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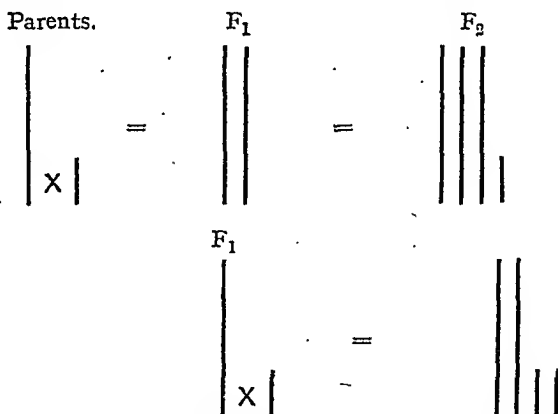


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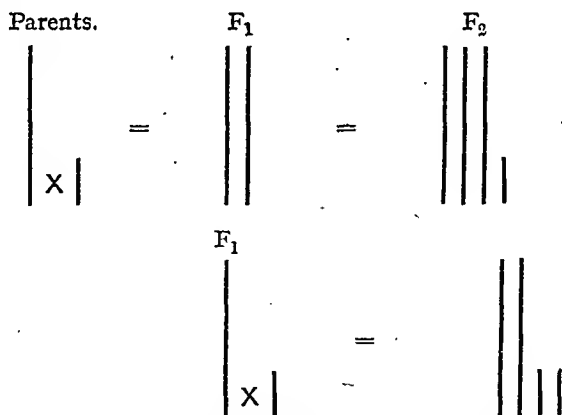


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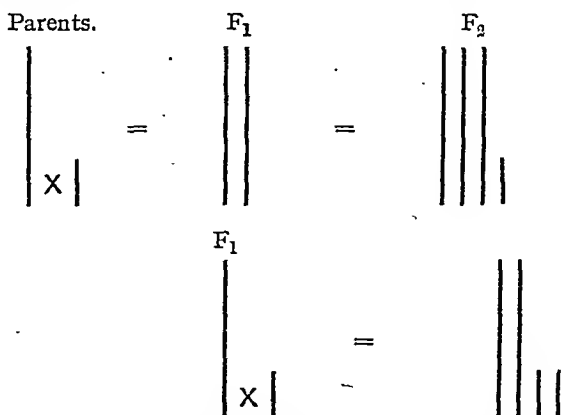


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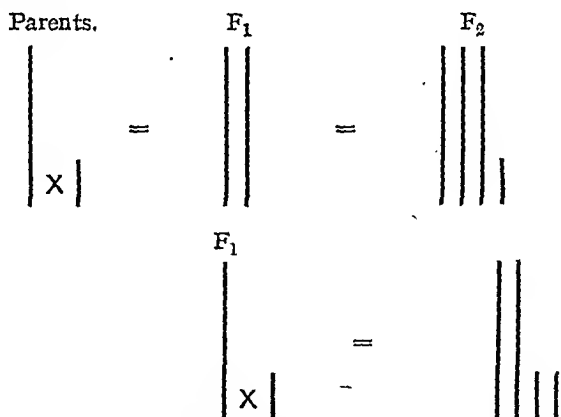


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SCHEME SHOWING THE MODE OF INHERITANCE OF CERTAIN DOMINANT AND RECESSIVE HUMAN TRAITS (NORMAL AND PATHOLOGICAL). THE BLACK AND WHITE CIRCLES REPRESENT THE GERM CELLS PRODUCED BY THE INDIVIDUAL.

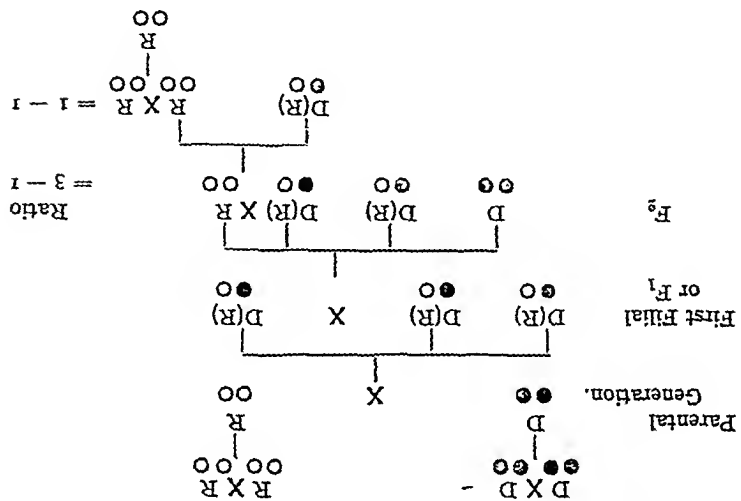


FIG. 11.

† The result in these guinea pigs may be represented thus:—

$B \times B$ $B \times W$ $W \times W$ $B \times W$ $W \times W$

B B W B B

* W being the albino experimented upon, which contained the \bullet ovary of a black animal.

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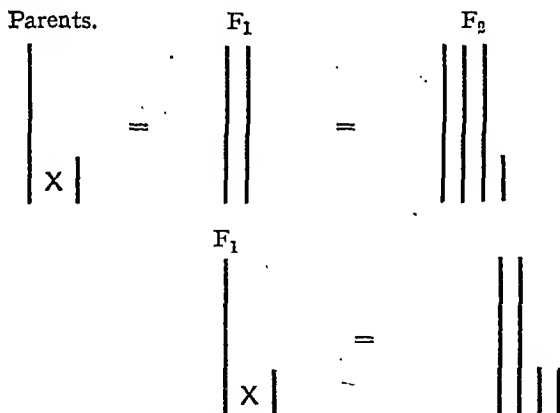


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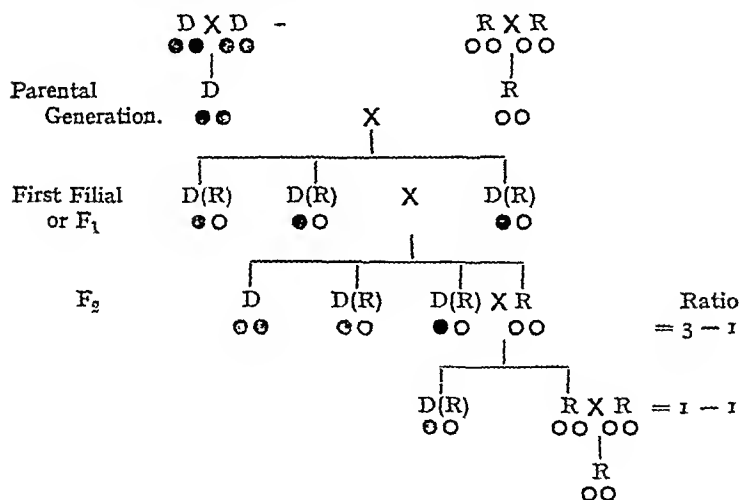
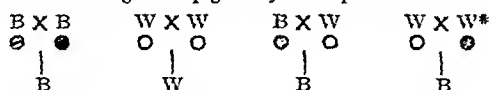


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A recessive is always pure and breeds true, whatever its origin; a pure dominant cannot be recognized from its appearance, but only by the way it behaves in reproduction.

If both parents show a recessive character, all the offspring will be recessive.

If one parent is an impure dominant and the other a recessive, the offspring will be of both kinds, in equal numbers.

If both parents are impure dominants, 25 per cent. of the offspring will be pure dominants, 50 per cent., impure dominants, and 25 per cent., pure recessives.

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Mendelism has shown that a type depends, not upon the apparent type of its parents, but solely upon the kind of germ cells from which it is formed. If these two germ cells are similar, the resulting individual will be pure, but not otherwise...

The question may be asked, "Is there any positive evidence that hereditary transmission depends upon germinal, as distinct from somatic, properties?"

An important experiment bearing on this point has recently been performed by Castle and Phillips, of Harvard. Castle says (8, p. 42), "A young albino female guinea-pig approaching sexual maturity was deprived of her ovaries, and into her body was introduced the living ovary of a freshly-killed black guinea pig of about three weeks old. She was later mated with an albino guinea pig. By him she bore two litters of living young, and died pregnant a little over a year afterwards, containing a third litter. Had she not been operated upon, her young, by this male, would undoubtedly have been albinos, for albino guinea pigs produce only albino young, as several investigators have shown. But those young which she did bear were, without exception, black, which character she clearly owed to the fact that they developed from eggs produced by the ovary taken at

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Mendelism has shown that a type depends, not upon the apparent type of its parents, but solely upon the kind of germ cells from which it is formed. If these two germ cells are similar, the resulting individual will be pure, but not otherwise.

The question may be asked, "Is there any positive evidence that hereditary transmission depends upon germinal, as distinct from somatic, properties?"

An important experiment bearing on this point has recently been performed by Castle and Phillips, of Harvard. Castle says (8, p. 42), "A young albino female guinea-pig approaching sexual maturity was deprived of her ovaries, and into her body was introduced the living ovary of a freshly-killed black guinea pig of about three weeks old. She was later mated with an albino guinea pig. By him she bore two litters of living young, and died pregnant a little over a year afterwards, containing a third litter. Had she not been operated upon, her young, by this male, would undoubtedly have been albinos, for albino guinea pigs produce only albino young, as several investigators have shown. But those young which she did bear were, without exception, black, which character she clearly owed to the fact that they developed from eggs produced by the ovary taken at

THE APPLICATION OF MENDEL'S THEORIES TO HUMAN INHERITANCE.

If the theories just mentioned hold true for human beings, it is clear that each individual, male or female, is a hybrid because of the double parentage, and must be a hybrid in every detail in which the two parents differ from one another.

This must apply not only to physical characteristics, but also to all inherited mental and moral qualities, whether normal or pathological.

An excellent example of Mendelian inheritance is furnished by the abnormality called Brachydactyly (14, 15, 16,

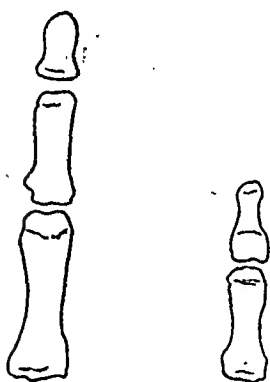


FIG. 12.

Phalanges
of normal
finger.

Phalanges of
brachydactylous
finger.

17 and 24)—a shortening of the digits due to defective growth of the phalanges. The abnormality is dominant to the normal type, and as each affected individual has had one similarly affected and one normal parent, his constitution is D (R). According to the key, both types of children should appear, and in equal numbers. Four families showing this condition have been reported in England. They contain 119 abnormal and 120 normal individuals. Moreover, there has been perfect

segregation, for the normal descendants (R) of the family, when married to another normal, have not, in a single instance, transmitted the defect. This is according to Mendel's law that the recessives breed true to the recessive character. Therefore, a normal member of a brachydactylous family need have no fear of bearing brachydactylous children if he or she marries out of the family. The condition here described is particularly fortunate as an illustration, because, being a physical character compatible with life, and also discernible at birth, it excludes possible discrepancy by blanks caused by premature deaths; a condition which does not apply where the transmitted character may be incompatible with life, or where its *manifestation* depends upon an outside factor, e.g., predisposition to a disease of an infective

character.

Mendel's second experiment, in which both parents were impure dominants D (R), throws light upon the inheritance of certain recessive features in man. In this experiment, one recessive (a dwarf plant) appeared in every four individuals produced in the F_2 generation, *i.e.*, two impure dominants produce 25 per cent. of recessive offspring. Translate this into human equivalents, where the recessive character happens to be an undesirable trait, such as mental deficiency, which is said to be recessive to the normal type. The two parents (husband and wife) are apparently normal; they may, in fact, be comparatively brilliant, but if each is descended from a defective stock, each may possess germ cells characteristic of the defect. Both will then have the constitution D (R), and, therefore, one child out of every four will probably be mentally defective. In other words, the characters common to the two branches of the family will be reproduced in their offspring, whether they be desirable characters, as robustness and mental ability, or undesirable ones, as constitutional weakness and mental deficiency. It is very remarkable that such desirable traits as artistic and musical ability are inherited precisely like mental deficiency, *i.e.*, as Mendelian recessives.

If one meets with an individual showing some congenital defect that is not present in a brother or sister, or in either parent, it may still be hereditary. It is most important, in such cases, to inquire about the grandparents and cousins, and if one or more of them be found similarly defective, it shows the condition is probably a recessive trait, and inherited on the same lines as dwarfness in peas. It is now clear why cousin-marriages cause anxiety. If both cousins belong to a sound stock, there is no biological objection to their marriage, but if they belong to a feeble stock, the weakness will almost certainly appear in some of their offspring.

Eye-Colour is very interesting from a Mendelian point of view because of the inheritance of two strongly contrasted colour types, one of which is dominant and one recessive, whilst both are considered normal (36). The dominant is the *dark brown iris*, the recessive the *pure blue*.

When both parents have very dark eyes, all the children

have dark eyes.

If both have blue eyes, all the children have blue eyes.

The other matings are shown in the following scheme, which should be compared with the key.¹

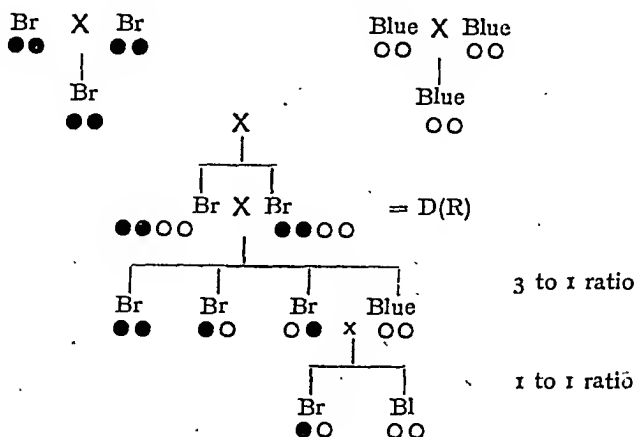


FIG. 13.

Hair colour has been carefully studied, and, amongst other results, it can be affirmed that red hair is recessive. On the other hand, the precise mode of inheritance of skin colour has not been worked out; sentiment seems to offer an unsurmountable barrier to the construction of pedigrees in India and elsewhere.

From what has been said, it might be inferred that whenever individuals show a pair of contrasted characters, one character will always be dominant to the other, but such is not the case; because dominance is not a feature of one of a pair of contrasted characters in *every* case. In some instances, two contrasted characters in the parents may become "blended," and form an intermediate character in the offspring. In the Andalusian fowl, for instance, there are two types, viz., the "black" and the "splashed white." When these are mated together, the offspring is the so-called "blue," neither white nor black, but intermediate between the parental types, and, when these blues are bred amongst themselves, they produce 25 per cent. whites and

¹ Pure bred dark brown eyes have pigment on anterior and posterior surface of iris; blue eyes only on posterior surface.

25 per cent. blacks, and 50 per cent. blues.

If Mendel's laws are true, it follows that man cannot escape from the result of his inheritance. If he be born with certain faculties or capabilities, these may be developed by a favourable environment; if these capacities are not in-born, then it is equally clear that no environment can make them appear, and they cannot be educated, for they are not there to educate. Man is born with certain abilities and certain disabilities; the former can be developed, but to try to cultivate a power that is lacking is as futile as an attempt to change an iris from blue to brown. Capacities may be trained and developed; they cannot be created.

A common error with regard to human inheritance is to assume that an individual characteristic will gradually, as the result of marriage in successive generations, become so far diluted as to be unrecognizable. Mendelians have shown that when a trait once makes its appearance, it may be transmitted generation after generation, and century after century, in undiminished force, and its latest appearance be as marked as its first. Brachydactyly does not show any sign of approach to the normal condition,¹ and the Hapsburg lip is as conspicuous now in a certain monarch as it was in the ancestors several generations ago.

The influence on the race of a single individual has been worked out in certain American families (12, p. 301-309). Elizabeth Tuttle has had amongst her descendants many university professors and presidents, famous lawyers, a chief justice, authors, naturalists, two presidents and one vice-president of the United States—a remarkable instance of the inheritance of mental ability.

The Jukes family (13 and 11), on the other hand, is equally notorious for its bad qualities. The members of this family, through several generations, were nearly all criminals, vagrants, alcoholics, harlots or paupers. There were 709 known descendants who were unfit for society (Havelock Ellis). They cost the state of New York over a million and a quarter dollars in 75 years, and their progeny still thrive.

It only remains to enumerate those human traits which have been found, *with more or less constancy*, to be inherited

¹ An abnormality has been inherited in the Talbot family since early in the Fifteenth Century to the present day.

on Mendelian lines, some as dominants, others as recessives. It will be noticed that the very large majority are abnormalities; the inheritance of normal traits has received comparatively very little attention.

A. DOMINANT TRAITS.

Hair.—Black or brown is dominant to red, and curly to straight (11, p. 32 and p. 20). Congenital lock of white hair (29, p. 331). A beaded condition, termed "Monilithrix" (11, p. 139).

Skin. chthysis (29), tylosis palmaris and plantaris (29), epidermolysis bullosa (29), xanthoma (29), hypertrichosis (29), persistent hereditary oedema (49), lentigo (H.D.), dermatographia (H. D.)¹

The Skeleton.—Brachydactyly (14) (17), minor brachydactyly (15, 16), polydactylism (?) (46), abnormal segmentation of the digits (18), symphalangism (9a) (H. D.), achondroplasy (11, p. 172), multiple cartilaginous exostoses (31) flat foot (H. D.)

Nervous System.—Hereditary ataxy (50), Huntington's chorea (35, 11, p. 103), bimanual synergia (22), spasmodic asthma (21), deaf-mutism (73).

Diseases of the Eye.—The following conditions when hereditary: Atrophy of the optic nerve (53), cataract (53, 54), displaced lens (53), glaucoma (53), retinitis pigmentosa (55), night blindness (57), aniridia² (20), heterochromia? (29) ptosis (5).

Vascular System.—Telangiectasis (29), splenic anæmia (29), sub-
thyroidism (33), varicose veins (H. D.).

Alimentary and Excretory Systems.—Diabetes insipidus (29, 71), hæmaturia (11, p. 169), absence of last molar teeth (H.D.).

B. RECESSIVE TRAITS.

The following have been reported as recessive traits: Albinism (2, p. 226), Alkaptonuria (28), Thomsen's disease (67) (hered. myotonia), astigmatism (11, p. 123), multiple sclerosis (11, p. 99), paralysis agitans (48),³ tallness of stature (11, p. 42), red hair (11, p. 32), left handedness (38a), epilepsy (11, p. 67),² feeble mindedness (11, p. 67, etc.), predisposition to insanity, pauperism (11, p. 83), and criminality, artistic ability (H. D.) (19),⁴ musical ability (38) (19).

Early decay of the teeth in the Welsh race is probably a recessive trait (H. D.)

Sex.—The male is probably recessive and the female dominant,

¹ (H. D.) means that the condition has been observed by the author but account not yet published.

² H. D. Paper before B. Med. Assoc. Meeting at Llangollen, May 24, 1908.

³ Lundborg. *Med. biol. Familien forschungen*, Jena, 1913.

⁴ For inheritance of ability, see Galton's *Hereditary Genius*. Hereditary ability was conspicuous in the following medical families: Hippocrates, Bartholini, Albinus, Monro, Pitcairn, Gregory, Chamberlen, Quain, Stokes Hunter, etc.

of the constitution D (R), whence follows the approximate equality of the sexes.

C.—A few conditions are practically confined to the male sex and transmitted by the mother to half of her sons, although she herself is apparently normal. The chief examples are: Hæmophilia, colour-blindness, pseudo-hypertrophic muscular paralysis (32), some cases of congenital night blindness (52). Other conditions may be D in female and R in male.

Some of the above are not of serious import; others are grave pathological conditions which handicap the individual, and may induce social burdens and dangers. The modern science of eugenics, founded by the late Sir Francis Galton, aims at fostering all conditions which tend to improve the inborn qualities of the race, and to eliminate those that are undesirable.

Mendel's work has shown, more clearly than anything else, how these objects are to be achieved, but the discussion of this subject does not fall within the scope of the present address.

In conclusion, it must not be assumed that all the hereditary features just enumerated have been fully worked out. Some of them have, but several, perhaps, the majority, require further elucidation.

Moreover, there are doubtless many other traits, normal and abnormal, which, on investigation, will be found to be inherited on Mendelian lines, so that there is abundant scope for anyone interested in this kind of research.

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SALVARSAN AND ITS SUBSTITUTES.

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THE position of salvarsan as a remedy for syphilis was well-established some considerable time before the war and one result of the war has been to make us feel how dependent we were on foreign chemists. The impossibility of now obtaining the original drug has compelled us to find out whether the same substance, or an equally good substitute, could be manufactured in this or an Allied country. The already considerable increase in the number of cases of syphilis, and the probable still greater increase in the near future, has accentuated the demand for some satisfactory substitute for salvarsan, and I propose now to give a short description of the substitutes which have recently been placed upon the market.

The English substitute for salvarsan, which is most frequently used, is kharsivan, and there is also a soluble compound corresponding to neo-salvarsan, which is called neo-kharsivan. The arsenic content of both salvarsan and kharsivan is 31.6 per cent., while that of neo-salvarsan and neo-kharsivan is only 21 per cent., so that 0.1 gramme of the former corresponds to 0.15 of the latter, and the dose of neo-kharsivan to be injected is 50 per cent. larger than that of kharsivan. Other substitutes "approved" by the Local Government Board are arsenobillon and novarsenobillon, and their method of employment is similar to that of kharsivan and neo-kharsivan.

Kharsivan is a yellow powder, which is soluble, if somewhat slowly, in saline solution. The best way to dissolve it is to pour the powder into a bottle containing glass beads, allowing the powder to mix with the beads, then to add 20 cc. of saline solution freshly sterilized and rotate the flask so as to mix the powder with the liquid. More saline solution is added up to 200 cc., and it is then found

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72. Weismann. *The Germ Plasm.* translated into English from the German edition of 1892, 1903.
73. *Treasury of Human Inheritance*, Ed. G. Karl Pearson.

insistently brought before our notice of late than ferrivine and intramine. Mr. McDonagh has introduced these compounds to our notice and has published most favourable reports of their action. He asserts that Ehrlich made a mistake in holding that salvarsan acts by virtue of its parasitotropic effect, whereas it merely increases the amount of active oxygen in the host's serum, and so acts indirectly upon the spirochæte. But this active oxygen in the serum can equally well be increased by any strongly adsorbed metallic compound, other than arsenic, such as iron in trivalent form, which is less toxic than arsenic. Ferrivine is therefore recommended in the early stages of syphilis, and it can be given in larger doses than salvarsan, and more frequently. In the later stages, a compound which increases the active oxygen in the serum indirectly can be employed, and in such cases he advocates the sulphur compound, intramine.

As to the chemical composition and affinities of these compounds, a lengthy discussion between Mr. McDonagh and Professor Bayliss has recently been published. I will not attempt to epitomize it, but simply quote Mr. McDonagh's final words in closing the discussion.

"I have stated that the hydroxides of both aluminium and iron have a therapeutic effect in syphilis, but it is necessary to protect them by an emulsoid colloid before they can be injected intravenously. Ferric hydroxide being an unstable colloid, I prepared ferrivine, which readily forms the hydroxide on reaching the blood-stream. It was this property and the result it sometimes has in causing shock, that made it necessary to add a protective. Unfortunately, as I have since found, the more protected a colloid is the less therapeutic action it exerts. To get over this difficulty, it will be necessary to prepare a compound with the iron more firmly attached to the benzene ring. If such a compound can be prepared, I am confident that, with the joint use of intramine, our treatment of syphilis will be more successful and less dangerous than it is with salvarsan and its substitutes." Such a statement is not unduly optimistic.

Of the clinical results obtained by the use of these compounds, I will only say that they are not always satisfactory, and some of the injections of the oily sus-

that a clear yellow fluid results. It is now necessary to neutralize with sodium hydrate, and it is best to use a 4 per cent. solution, of which about 4.8 cc. are required to neutralize 0.6 gramme of kharsivan, *i.e.*, 0.8 cc. to every decigramme. The saline solution is of the strength of 0.6 per cent.

Neo-kharsivan dissolves quickly in this fluid, and requires no neutralization. If a dilute solution for injection is required, the dose (usually 0.9 gramme) of the salt is dissolved in 200 cc. of the saline solution and injected at blood-temperature into the median cephalic vein. Or a concentrated solution may be employed, when the same quantity of the salt is dissolved in 10 cc. of saline solution and similarly injected. But, when using the concentrated solution, it is very necessary to make absolutely certain that the needle is in the vein. This can best be done by withdrawing the piston slightly after insertion of the needle; if the needle is in the vein, some blood will enter the barrel of the syringe. Failure to adopt this precaution may cause thrombosis of the vein, or serious inflammation of the arm. The injection is painless, and, if the patient is kept quiet for some hours after the injection, complications rarely ensue. Several injections at intervals of a week or ten days must be given, and in my practice I alternate these injections with intramuscular injections of *huile grise*, corresponding to 6-7 centigrammes of mercury for each dose. This is best done by using a preparation of mercurial oil, standardized to 40 centigrammes of mercury by weight to the cubic centimetre. A syringe is employed of the dimensions of a quarter of a cubic centimetre, which is divided into ten parts. Each part, or division, thus corresponds to one-fortieth of a cubic centimetre, or to one centigramme of mercury, and the usual dose which I employ is contained in 6-7 divisions of such a syringe. The injection is given intramuscularly at the customary intragluteal point, either with or without the previous injection of a little eucaine solution.

Of the use of suppositories of kharsivan, containing 0.1 gramme, twice a day, I will only say that such a method, as also that of rectal injection, of treatment has certain advantages in nervous patients, but I myself prefer the intravenous method whenever possible.

No drugs for the treatment of syphilis have been more

effect, and the results of such treatment are not infrequently satisfactory. Small doses must also be given, at any rate for the first injections, in cases of nephritis (chronic), hepatic cirrhosis, alcoholism, and cardiac insufficiency. In such cases, symptoms of vertigo, fainting, convulsions, or vomiting are likely to occur after even moderate initial doses of galy; therefore, it is wiser to begin with small doses.

A French substitute, which has been largely employed by Gaucher and other dermatologists in Paris, is hectine. It is put up in bulbs of 1 cc. volume, each containing 10 centigrammes of hectine. A course of treatment consists in the intra-muscular injection of ten of these bulbs, one being injected every other day. It is advisable to supplement this treatment with intra-muscular injections of mercurial oil.

Another French arsenical compound, which is now almost discredited because of the optic atrophy and blindness which it caused, is atoxyl. But atoxyl was the starting point for salvarsan. Both are aniline derivatives, containing an arsenical group directly attached to the benzene nucleus. Salvarsan was originally obtained by using atoxyl as a starting point and condensing so as to obtain two derived amino-molecules united by the arsenical groups. Neo-salvarsan was obtained by the introduction of a simple side-chain group giving a substance with more favourable solubility. The credit of discovering the therapeutic efficacy of atoxyl must be ascribed to a Canadian, named Thomas; but atoxyl, the starting point of the salvarsan group, was discovered by the famous French chemist, Béchamp, in 1863. He obtained it, soon after the first of the aniline dyes had been synthesized by Perkin, by heating a mixture of aniline and arsenic to about a temperature of 190° C. He described its properties accurately, but nothing more was heard of it, until it was placed on the market as a remedy for certain skin diseases by a Berlin firm, called the Lanolinfabrik Martinikenfelde. By them it was christened atoxyl, but its formula and method of manufacture was incorrectly described—intentionally. The compound was the same as that discovered by Béchamp, as was subsequently acknowledged by Ehrlich, but it is Thomas whom we have to thank for its application to diseases due to trypanosomes and protozoan

pension of intramine are, at least, not altogether painless—due to no fault in technique.

But, quite recently, a new preparation of intramine has been placed on the market, which is an aqueous colloidal emulsion, the individual particles of which are said to be of ultra-microscopic proportions. The emulsion is supplied in 5 cc. ampoules, half of one of which is, in adults, injected into each buttock. The dose may be repeated, so it is stated, as often as is desired, and may be exceeded with impunity, since intramine is absolutely non-toxic. It is claimed that such injections are "comparatively painless." My own experience of such injections is too short to say with authority how exactly the word "comparatively" must be translated.

Intramine is essentially a reducing agent, and the clinical effects of this new aqueous emulsion on the spirochæte pallida have yet to be studied in the records of a large number of syphilitic patients.

Galyl is a French preparation, containing 35 per cent. of arsenic and 7.2 per cent. of phosphorus. It is a yellow powder, which dissolves readily in a solution of sodium carbonate, and a requisite amount of this solution, isotonic with the blood serum, is supplied with each tube of galyl. The solution for injection is easily prepared by breaking the cylindrical vessel containing the galyl and nitrogen gas (which fills the rest of the vessel) and pouring in the sodium carbonate solution. If it is desired to use a concentrated solution, the mixture is drawn up into a 10 cc. syringe and directly injected into a vein. If, as I myself prefer, a dilute solution is to be used, the galyl and sodium carbonate solution is mixed with 100 cc. of sterilized water, and injected into the vein by a syringe with a three-way tap. I usually inject into the median basilic vein, for the procedure is easier with this vein than the median cephalic, especially in very muscular men. The dose with which to begin is one of 0.2 gramme, and this is repeated a week afterwards, if the first dose causes no unpleasant symptoms. After these two initial doses, four more doses of 0.25 gramme are given at weekly intervals, and the Wassermann reaction is then usually found to be negative. In cases of early primary chancre, smaller doses may be given every other day, so as to get a more rapid

is an arsenobenzol compound combined with silver. Silver nitrate has, of course, long been used for syphilitic plaques, and colloidal compounds of silver as injections in septic conditions. Charcot showed how little poisonous silver is, indeed poisonous symptoms were shown to appear only after absorption of 30 grammes of silver nitrate. Danysz, of the Pasteur Institute, tried to combine silver with an arsenobenzol compound, by mixing a solution of silver nitrate with a watery solution of dioxy-diamino-arsenobenzol. A clear brownish solution resulted, and when sodium chloride was added to this, a flocculent precipitate formed. On the addition of sulphuric acid, a pale-yellow precipitate formed, and the fluid contained only traces of arsenic and silver, showing that silver and chlorine had been fixed by dioxy-diaminobenzol. Danysz then proceeded to replace chlorine, which has no therapeutic use in syphilis, by bromine. He thus obtained a bromo-silver-arsenobenzol, which proved very efficacious, and which he called "88·2." To improve the efficacy of this drug, he proceeded to add to it some trichloride of antimony, and so arrived at luargol, or 102. Luargol, therefore, contains silver, bromine, antimony, and 20·70 per cent. of arsenic.

In sleeping sickness, luargol is 75 times more active than atoxyl; 30 times more active than arsenophenyl glycine, and 10 times more active than arsenobenzol. Danysz's experience shows that "102" has greater curative powers in trypanosomiasis than any other arsenical compound. Thus, the evolution of surra in rabbits is about the same as the evolution of trypanosoma in men. Fever and wasting follow an incubation period of 5 to 7 days. Skin and mucous membrane lesions appear 30 to 50 days after inoculation. All arsenical compounds cure the animals, if treatment is started during the incubation period. If treatment is started during the second period, arsenobenzol, atoxyl, and arsenophenol glycine give only a percentage of cures, while "102" cures them all. When lesions have appeared during the last period, "102" alone can cure five out of six cases, with a dose of 0·01 cg. per kilogramme. Other arsenical compounds in the same dose produced no beneficial results on the animals. It is remarkable how low the toxicity of luargol is, as compared with other arsenical preparations similarly injected—in other words,

diseases. Atoxyl was used as a starting point for salvarsan, and condensing in such a way as to get two derived amino molecules united by the arsenical groups. Bertheim, the director of the Höchst Anilinfabrik, obtained the salt salvarsan by turning the whole of his staff on to the work. The story has been amusingly told by Professor Moore.

The latest anti-syphilitic remedy, or substitute for salvarsan is a French one named luargol, or "102," which has been used at the Hôpital Cochin in Paris and elsewhere with apparently great success. Luargol is a yellowish powder, soluble in sodium hydrate solution to the extent of 1 gm. to 0.4 cc. of the soda solution, but it is insoluble in water. The powder dissolves best and most quickly if one gramme of it is added to 15 cc. of a 4 per. cent. solution of sodium hydrate. The solution is then dark brown in colour, or almost black, and it is injected intravenously in the same way as salvarsan, either in concentrated solutions, as in Ravault's method of injecting neo-salvarsan, or in dilute solutions by a syringe with a three-way tap. The concentrated solutions must be injected slowly, and care must be taken that the needle is actually in the vein. Indeed, it is better after inserting the needle, to make sure that it is in the vein by first attaching to it a syringe containing normal salt solution and injecting some of this. If it passes into the vein this syringe can be detached and a similar syringe, containing the luargol solution, fitted to the needle, and the injection of the luargol made. When using a concentrated solution, the first dose given is 15 cc. of a 1 per cent. solution, and five subsequent injections are given at intervals of two or three days of 20, 25 or 30 cc. When dilute solutions are used, it is best to use a 1 in 1,000 solution and inject 150 cc. for the first dose, gradually increasing the dose to 300 cc. The intervals are the same, namely, two to three days, and six injections should be given, so that the patient gets from 1 gramme to 1.5 grammes of luargol in all. The patient should go without food for four hours before and four hours after the injection, and should lie down after the injection. In cases with nervous or other complications, the dose must be diminished; in children and women, and in kidney affections, heart disease, and syphilitic meningitis, the dose must be quite small to begin.

The chemistry of luargol is somewhat complicated. It

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one-fiftieth, or less, of the toxic dose will have curative results in the animal. One-tenth of a gramme is a very small dose, and yet this is the initial dose recommended in the treatment of syphilis in females—in males it is a little higher—but the quantities of luargol required for the cure of syphilis are very much smaller than of salvarsan, neo-salvarsan, or other substitute.

In the employment of all these arsenic compounds, unfavourable complications sometimes follow their injection. Thrombosis of the vein may occur, if the solution is not properly prepared or the soda used for neutralizing the solution is not chemically pure. Sometimes there is a rise of temperature, vomiting, headache, or gastro-intestinal symptoms, and a scarlatiniform rash has been seen. Still more severe symptoms of poisoning occasionally occur, such as convulsions, dyspnoea, congestion of the face, accompanied by well-marked fever, and it has been shown by Danysz that such symptoms are always due to a precipitate of arsenobenzol in the circulatory system, and generally in the capillaries of the lungs, such as is brought about by an excess of phosphates and certain other salts in the blood. Such accidents can best be avoided by using a dilute solution for injection in preference to a concentrated solution.

Difficulty has lately been experienced in obtaining chemically pure sodium hydrate to dissolve the luargol, and this has accounted for some of the unfavourable results, but in future a sodium preparation of luargol will be placed on the market, which dissolves in distilled water like neo-salvarsan, and possibly toxic symptoms caused by the use of improperly dissolved luargol will be eliminated.

Without making any extravagant claims for salvarsan—in fact, I have always used it in conjunction with mercury—I think it, or one of its substitutes, is absolutely essential in the treatment of syphilis. In the absence of the German made product, an attempt has here been made to give a fair and impartial account of the British and French substitutes. That one of them will prove equal, or superior, to salvarsan, there can be little doubt. Each syphilologist has, of course, his own special preference, and, so far, no one substitute for salvarsan can be said to have ousted out all the others from the field.

A SIMPLIFIED TECHNIQUE FOR THE ADMINISTRATION OF NEO-SALVARSAN.

By C. E. JENKINS, M.R.C.S., L.R.C.P.

THERE have lately been numerous articles in the medical press on the wider use of Neo-salvarsan and its substitutes. The main excuse for this note is, that it describes in detail a very simple technique for the administration of the drug in concentrated solution, which may be of some use to medical practitioners who desire to use it but lack practical experience. The patient is put to bed for twenty-four hours before the injection, castor oil is given overnight, and no food allowed for at least four hours before the injection. The urine should contain neither albumen nor sugar.

The apparatus required consists of:—

- i. Glass syringe, capacity about 15 cc.;
- ii. Needle about two inches long;
- iii. Two medicine glasses of the usual pattern;
- iv. A flask containing about 100 cc. of sterile normal saline solution, if possible made from distilled water.

The glasses, syringe, and needle should be sterilized by boiling for 10 minutes immediately before the operation, lifted out of the sterilizer by a pair of forceps, and, if sterile towels are not available, laid upon a piece of lint previously wrung out in $\frac{1}{1000}$ perchloride. The points of the forceps may be sterilized by holding them in the flame of a spirit lamp for a few seconds.

The apparatus having been laid out on the cloth, about 50 cc. of saline are poured into one of the medicine glasses, the syringe filled from it, and the contents of the syringe expelled into the second glass, in which the Neo-salvarsan has already been placed. Solution usually occurs easily; if necessary, matters may be hastened by plunging the glass into a bowl of hot water from time to time.

The solution should be clear yellow in colour. A sample should be discarded as dangerous if (i) it fails to dissolve completely, (ii) dissolves to form a bright red solution, or (iii) deposits a scarlet precipitate after going into solution. The solution should next be drawn up into

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left hand steadies the needle, the right should manipulate the syringe, the fingers holding it and the thumb pressing the piston home.

The injection ought not to be given by one swift stroke of the piston; this should move at a speed not much faster than the second hand of a watch, which means that the time taken to give the injection is about ninety seconds.

A slow rate of flow causes the solution to mingle with the blood stream drop by drop, and to be diluted as it enters. The risk of thrombosis of the vein is said to be increased if the vein, even for a short space of time, is filled solely by the concentrated solution. Whilst the solution is passing into the vein a careful watch is necessary to see that none of it escapes into the surrounding tissues, an occurrence which is generally due to displacement of the needle. If this happens, a small swelling is formed at the site of injection, and increases in size if the injection is continued.

As the needle point may be projecting through the far side of the vein, the needle is withdrawn a little and the piston cautiously pressed again. Provided no enlargement of the swelling is observed, and there is no obvious resistance to the piston, the injection may be completed.

An increase in size of the tumour necessitates a complete withdrawal of the needle, and its insertion at some other point. The swelling is left until the administration is completed, when it is treated in the following manner.

The syringe, with needle attached, is rinsed out with normal saline, then filled with the same, and the needle thrust into the swelling so that its point lies approximately in the middle of the mass. The piston is then pressed, rather forcibly, so as to expand the swelling to three or four times its original diameter. The result is that the solution is greatly diluted, a condition which favours its easy absorption, and aborts that tendency to local necrosis which is liable to occur when concentrated solutions of arsenical compounds escape into the subcutaneous tissues.

It is not necessary, provided the injection has been given slowly, to wash the vein with saline after the injection. The blood stream does all the irrigation that is necessary. A firm bandage is applied, and the patient is kept in bed for the remainder of the day.

the syringe, air bubbles expelled, the syringe laid down again, and the needle detached.

The skin of the patient's arm is best sterilized by a 2 per cent. solution of iodine in rectified spirit, or by the tincture of iodine.

The vein is made to stand out by compression of the upper arm. This is most conveniently performed by an assistant gripping it between his two hands, the degree of compression thus attained is quite sufficient in the majority of cases—certainly so in most males. The method has the advantage that a simple order suffices to remove the compression without more ado. If the operator is working alone, the arm may be compressed by a rubber tourniquet clipped with a Spencer-Wells forceps.

The next step is to pass the needle into the vein. The largest vein on the front of the elbow joint should be selected. The patient is made to hold his arm out perfectly straight and to clench his fist. The needle, still detached from the syringe, is held nearly parallel to the skin, and thrust upwards into the vein. The needle has a bevelled point, and the bevelled surface should face away from the vein, otherwise the bevel may slide along the wall of the vein and refuse to penetrate. As the needle is passing through the wall a slight increase of resistance is felt, which disappears when the point is through. Blood immediately begins to flow from the needle in a steady trickle, and the operator may proceed to the next stage.

If a drop or two of blood appears and the flow then ceases, it usually means that the needle has been thrust right through both walls, and can often be remedied by withdrawing it about a quarter of an inch, when blood should flow freely. If the vein tends to roll away, it may be steadied by the finger and thumb of the left hand.

A blunt needle can cause more trouble than anything else. It slides on the vein, will not penetrate, may go through with a jerk and so out through the other side, it makes a jagged hole instead of a neat puncture, and, lastly, is extremely painful to the patient. A sharp needle is most essential. The filled syringe may now be attached to the needle, which should be held firmly during the process of attachment lest a chance movement displaces it. The compression on the upper arm is next removed. Whilst the

surgery; a few minutes later I was called out to see him, and I found him lying on the ground in a state of collapse. He was carried back to the surgery, and although everything was done to revive him, he succumbed fourteen minutes after the injection. Death, in the second case, occurred within seventeen minutes of the administration of the drug.

The post-mortem examinations presented no pathological clue to the sudden cause of death. There was anæmia of the brain; the heart was in a state of diastole; there was very marked congestion of the lungs as well as (though not, to such an extent) of liver, spleen, and kidneys. The stomach and intestines—particularly the small gut—were enormously distended.

What was the cause of death? The shortest interval of time in which death has occurred, as far as I know, is three hours after injection. In this case, however, the drug (salvarsan) was injected *intra-venously*, and, therefore, was put directly into the circulation; besides, in this case, death occurred from anuria. In my two cases, death occurred much more quickly, and the injection was given *intra-gluteally*, so that the drug could not have entered into the circulation, since the absorption of organic preparations of arsenic, when administered in this manner, is comparatively slow, as late as 36 hours at times; from the above, too, it follows that idiosyncrasy had no play on this occasion, the drug *not* having been absorbed.

The only possible explanation, it seems to me, as to the cause of death, is shock. Hutchison, in his *Applied Physiology* (1909), says, "Physical and emotional influences may so stimulate the cardio-inhibitory centre as to lead to instant and fatal arrest of the heart's action," and then he gives several examples of such cases as mentioned in Balfour's *Diseases of the Heart* (1898).

Another point is that the boy, J. E., seemed perfectly all right till he saw the other boy carried back to the surgery. If this happens to be a coincidence, it is really a most extraordinary one; at 13 or 14 years of age, a boy is at a very impressionable period of life.

Lastly, the signs found at the post-mortem examinations *in both cases* are the signs we usually encounter in death from shock in otherwise healthy individuals.

CASES WITH COMMENTS.

TWO CASES OF SUDDEN DEATH AFTER KHARSIVAN INJECTION.

By S. VASSALLO, M.D.

Medical Officer, Leeward Islands.

THE only apology for recording these two cases is the most unusual occurrence of sudden death following such injections.

We have all heard of deaths resulting from the introduction into the system of organic preparations of arsenic, in the treatment of syphilis and other spirochætal infections, but a certain interval always elapsed between the injection and the fatal issue.

The preparation used for these two cases was "kharsivan," which is identical in essential particulars with the corresponding products of German manufacture.

First of all, it may definitely be stated that death, though it followed the injection, was not due to the kharsivan, because it ensued so rapidly that there was absolutely no time for the kharsivan to be absorbed.

The following are notes of the two fatal cases:—

CASE 1.—S. D., black boy, ætat. 13 years. Had yaws, when two years old, which got quite better after about three months, and the patient felt quite well for a very long time. Since three months, he had a foul-smelling and very unhealthy-looking ulcer in the sole of the left foot, the right sole was also extensively involved and presented several rugged, irregular ulcers. There seemed to be present also a second eruption of yaws, in its initial stage.

CASE 2.—J. E., black boy, ætat. 14 years. Had yaws some five or six years ago, and has never been quite free from it; he was never under medical treatment. Had crap-pox, which had lasted for some time, apparently.

Both boys were physically examined, and nothing abnormal was discovered in any of their organs; 3 gm. of kharsivan was administered to each boy, in the gluteal region. An important point to note is that the injections were freshly prepared from separate tubes, the rest of the tubes being given to other patients, who never showed any ill-effects. The series of events that followed each injection in these two cases, was so identical that one description will apply to both.

Immediately after the injection, the patient walked out of the

surgery; a few minutes later I was called out to see him, and I found him lying on the ground in a state of collapse. He was carried back to the surgery, and although everything was done to revive him, he succumbed fourteen minutes after the injection. Death, in the second case, occurred within seventeen minutes of the administration of the drug.

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Practical Notes.

"TRENCH-FOOT."

Fiessinger defines this affection as a syndrome, characterized by sensory, motor, vascular, and trophic symptoms localized in the lower limbs, and following on a more or less prolonged stay in the trenches during the cold season. Sainton distinguishes several clinical forms:—

1. *Slight*: (a) the painful foot (simple algid form); (b) the macerated foot; (c) the livid foot (cyanotic form).
2. *Moderate*: (d) the white œdematous foot; (e) the red œdematous foot; (f) the big red œdematous foot; (g) the big red œdematous foot with bullæ; (h) the big red œdematous foot with ecchymoses.
3. *Severe*: (i) the circumscribed gangrenous form; (j) the generalized gangrenous form.

The symptoms are due to various causes: standing still in water, liquid mud, and melting snow; the persistent impregnation of the boots with damp, the contraction of the leather and the constriction of the foot which result from this, the impeding of the circulation giving rise to swelling of the foot and the small of the leg.

Methods of prevention. 1. *In the trenches.*—These must be kept as dry as possible by means of drains, sumps, metalling, planking, or hurdles. Exercise must be taken as often as possible and standing still for long periods avoided. The foot and boot should be greased with tallow or with a mixture, recommended by Piedallu, consisting of 90 parts of tallow, 8 parts of neat's foot oil, and 2 parts of petroleum. Another application is composed of flour of mustard, free from oil, 1 part, anhydrous lanoline, 50 parts, and 5 parts of water. The boots must be large, and two pairs of socks should be worn; or, if only one pair is available, the foot should be wrapped in paper before putting on the sock. The putties must not be pulled tight. A dry pair of socks should be kept for changing into. The boots should be taken off once each day and the feet and legs rubbed for ten minutes; passive movements of the foot and toes should be employed briskly, and a dry pair of socks put on.

2. *In the billets and cantonments.*—The feet must be kept clean and comfortable and be rubbed once each day. The boots must be cleaned, dried and then greased; the socks must be washed. The feet must never be brought near a big fire.

Methods of treatment.—The patient must be kept lying down in bed. Every hour the feet must be rubbed for five minutes and then wrapped up in wool. If the pain is severe, analgesics, such as anti-pyrin and morphia must be given, or hypnotics like chloral and barbitonum. For œdema, with or without bullæ, an inclined plane is made with planks in the bed for the legs to rest upon, thus bringing the feet higher than the rest of the body. Every hour the patient holds up the leg vertically by pulling up the thigh, and, whilst in this position, all possible movements of the ankle, foot, and toes are carried out. No massage is to be used. For excoriations, Raymond and Parisot use compresses soaked in borax and camphor solution.

Courcoux prefers to swab them with a 5 per cent. solution of formol in equal parts of alcohol and glycerine. For ulcers, Sicard uses:—

R	Tincturæ iodi	-	-	-	-	℥xv.
	Glycerini	-	-	-	-	℥v.
	Spiritus Vini Rectificati (70 per cent.)	-	-	-	-	℥i.

Misce.

Algave uses a 10 per cent. solution of gomenol in oil for dressings; de Fleury applies Reclus's ointment or camphor ointment; and Brocq carron oil, freshly prepared, to which has been added laudanum to 5 per cent. An injection of anti-tetanic serum should always be given.

To prevent sphacelation, hot air is chiefly preferred, but Dalignat recommends local applications of steam. Walther powders the wound with lacteol. Some surgeons give hypodermic injections of oxygen to limit the necrosis. On bleeding ulcers, Lacapère and Lenormant apply gauze soaked in a solution of arseno-benzol.—(*J. des Prat.* Jan. 6, 1917.)

A POWDER FOR PHTHIRIASIS.

The troops at Salonika are greatly troubled by a plague of lice, not an unusual event in the East. Camphor was tried, but something more effective was required. A. Simon carried out several experiments for this purpose. A powder was considered to be more suitable, being easier to transport, to distribute, and to use than fluid preparations, although these are of proved value, particularly in the treatment of infected clothing. Powdered pyrethrum flowers gave the best results, killing the insect in a few minutes; but the supply is running short, and it was necessary to find an efficient substitute. At first, additions were made to the pyrethrum powder of 10 per cent. of camphor, 10 per cent. of naphthaline, and 5 per cent. of eucalyptus oil. The effects of this mixture were remarkable. It was put up in small sachets made of thin paper, one drachm of the powder in each. One was supplied to each man, who dusted about half the powder over the hairy parts of the body, and then pinned the sachet to his shirt. He was relieved completely and at once of his pest. As stated above, the scarcity of pyrethrum made a substitute necessary. Talc was tried as the excipient, but did not give satisfactory results. Infusorial earth was found to "fix" the volatile bodies used, and was extremely efficacious. A sample of the new powder enclosed in a simple paper envelope on April 1 was found, at the end of June, to produce quite as good results as some freshly prepared powder or some kept in an airtight jar. The formula is:—

Turpentine (oleo-resin)	-	-	-	℥v.
Xylol.				
Oil of Cade.				
Oil of eucalyptus	-	-	ana	℥i.
Oil of cloves	-	-	-	℥iiss.
Naphthaline	-	-	-	℥iiss.
Kieselguhr	-	-	-	℥xvj.

Eugenol may be used in place of oil of cloves. If pyrethrum is obtainable, 10 ozs. of the powder added to the above will greatly increase its parasitocidal effect.—(*J. de Méd. et de Chir. prat.*, Dec. 10, 1916.)

Reviews of Books.

Nerve Injuries and their Treatment. By PURVES STEWART, M.A., M.D., F.R.C.P., and ARTHUR EVANS, M.S., M.D., F.R.C.S. Pp. 208. London: Frowde and Hodder and Stoughton. 8s. 6d. net.

IN this book there will be found a useful account of the symptoms and treatment of injuries of the peripheral nerves which, at the present time, are so frequently met with as a result of gunshot wounds. On the medical side, good accounts of the methods of examination and diagnosis of the lesions are given, and, from the surgical aspect, the general rules for treatment are clearly and usefully described. The book is well illustrated, and should be of considerable assistance to those whose work is connected with war injuries.

The Basis of Symptoms, the Principles of Clinical Pathology. By Dr. LUDOLPH KREHL. Authorized Translation by ARTHUR FREDERICK BEIFELD, Ph.B., M.D. Pp. 517. London: The J. B. Lippincott Co. 21s. net.

A BOOK which has passed through seven editions in its own country (Germany) and has had three American editions must necessarily have supplied a want. In a descriptive note at the commencement of the volume, Sir William Osler writes: "In Professor Krehl's work, disease is studied as a perversion of physiological function, and the title 'Clinical Pathology' expresses well the attempt which is made in it to fill the gap between empirical and scientific medicine."

The author expresses the same idea in other words: "In my opinion, then, there is but one correct way to study the majority of morbid processes and the functional disorders of the organs which produce them, and that is by a comprehensive comparison of physical and chemical anomalies in disease with conditions as we know them in health."

The whole subject of a symptom is considered from all points of view. Take, for example, the article on "Nephritic Œdema." The author begins by saying that some of the dropsies which accompany nephritis are unquestionably due to simple stasis. There are, however, many others in which the Œdema occurs independently of any cardiac weakness, and he goes on to discuss all the possible conditions which may give rise to it. While some nephritic Œdemas apparently depend upon the retention of sodium chloride in the body, he adds: "Attractive as is this conception, it leaves much to be explained, for in many cases of nephritic Œdema there is no evidence of salt retention."

Every chapter is followed by a lengthy bibliography, but almost

entirely confined to German authors. For instance, out of the 178 references in the article on "The Circulation," there are only 20 which are not of German origin.

His remarks on the importance of sparing the mechanism of sugar metabolism deserve careful attention: "Thus a diabetic who to-day can tolerate 100 grams of white bread may, in the course of a few months, if kept within his tolerance limit, be able to assimilate 120 to 140 grams with no ensuing glycosuria." He is of opinion that "the full significance of the pancreas in the mechanism of sugar metabolism is still unsettled. The most likely interpretation hinges on the conception of an internal secretion." The broadness of the outlook taken by the author is shown by the following: "We regarded scornfully the crazes for the diatheses of the earlier teachers, and forgot how narrow we ourselves were becoming. Now the pendulum has swung back once more, and we are beginning to understand that this 'local pathology' is not comprehensive enough. Thus we meet with disturbances of function for which no organic substratum can be discovered—or, indeed, could be responsible—and in which a more general and extensive derangement must be assumed; while in some conditions, though a local change is found, and is without doubt ætiologically significant, such a change is not sufficient to explain the functional disturbance in all its phases." The extracts we have given will indicate the scope of the work; it is so packed with information that it is rather to be used as a work of reference than to be read through as an ordinary text-book on medicine.

Common Disorders and Diseases of Childhood. By G. F. STILL, M.D., F.R.C.P. Third edition. London: Frowde and Hodder and Stoughton. Pp. 846.

THIS volume, representing, as it does, the clinical experience of one of the best known children's physicians, scarcely needs any notice. Since the appearance of the second edition Dr. Still has added some new chapters to the book, and has, as he says, corrected and noted here and there. The most considerable addition is a lecture on the "cœliac disease." Those to whom this curious disease is known will turn with interest to this chapter, for there is no affection which more closely taxes the resources and wisdom of the physician. Dr. Still insists strongly on the possibility of a complete recovery, and, as to that, no physician of experience would hesitate to agree with him; but he appears to be willing to go further, and to imply—though his phraseology is not quite definite—the possibility of recovery without any perceptible after-effects. On that point we disagree with him, though we do not question his great clinical experience. We have known several children who have recovered from this complaint, but we have never yet seen one who could be said to have afterwards attained normal development and normal digestion. As to the causation of this complaint, Dr. Still confesses that he is in the dark; it is probably a bacterial affection, but the positive

evidence for this hypothesis is not forthcoming.

There is nothing further to be said about this new edition of a book which has already an established reputation. In clinical experience and ability to set it forth in an attractive manner, Dr. Still has few equals, and no superiors.

Nervous Asthma: its Pathology and Treatment. By J. B. BERKART, M.D. 8vo. Pp. 54. London: H. Milford. 2s. 6d. net.

Dr. BERKART is well known as a writer on the subject of asthma. In the booklet now under consideration, he emphasizes the fact that two distinct forms of paroxysmal dyspnoea are confused together under the names bronchial, spasmodic, or nervous asthma. In the commoner form of asthma there is bronchial blocking, with definite mechanical obstruction to the passage of air in and out of the lungs. In the latter form of asthma, which may properly be described as nervous asthma, there exists, at the time of paroxysmal dyspnoea, no mechanical obstacle in the air-passages, but the patient has a nervous constitution. In both varieties of asthma, Dr. Berkart believes the patients to have been rickety in their childhood; in the case of nervous asthma, there is also a neuropathic diathesis. As for treatment, Dr. Berkart insists on the discontinuance of antispasmodic, purgative medicines and nostrums, and employs but few symptomatic remedies. Fresh air, exercise, a plain and nutritious diet are the chief indications. The book is interesting reading, and should be in the hands of all who have to do with asthmatic patients.

beri-beri in its Earlier Symptoms and Treatment. By ESPINE WARD, M.D., West African Medical Staff. Pp. 84. Belfast: Mayne, Boyd and Son, Ltd., and Wm. Mullan and Son.

This booklet represents a Thesis for which the degree of Doctor of Medicine was conferred by the Queen's University of Belfast. The author's object in writing this account of beri-beri is to show that, under certain conditions, hand-milled rice will produce beri-beri. As is well known, the generally accepted view of the causation of beri-beri now is that the disease is due to the continuous assumption of white (polished) rice as the staple article of diet. Generally such rice does not cause beri-beri, and it has been stated that hand-milled rice does not cause beri-beri. After a survey of the literature, the author details observations of thirty cases of beri-beri under his care, and due, in his opinion, to native Sierra Leone hand-milled rice, used as the staple and only article of diet. The symptoms and treatment of the cases are summarized.

Preparations, Inventions, etc.

NON-RUSTING STEEL AND OTHER INSTRUMENTS FOR EXPLORING,
CLEANING AND DRESSING WOUNDS AND FOR OTHER
PURPOSES.

(London: Messrs. Mayer & Meltzer, 71, 61, Portland Street, W.)

Mr. C. J. Heath, F.R.C.S., writes: Various antiseptics have of late been recommended for the sterilization of the deep and irregular wounds which arise in warfare. Instruments which aid in their effective use have not, however, been equally forthcoming; I am therefore hopeful that some of those here depicted will prove useful for this purpose. I recently assisted by invitation a general surgeon at an operation upon a friend, in the course of which an abscess was opened; the abscess cavity extended so far that not one of the instruments upon the table was long enough to explore or even, indeed, to irrigate it. This experience emphasized the need of, and induced me to design (1) the probes illustrated in Fig. 1. They vary in length from seven to fourteen inches and are fitted with large hollow handles in order to admit of delicate manipulation. Their stems are made of highly flexible copper and their bulbs of duralumin, an extremely light alloy of aluminium. The whole instrument is silver-plated, for this plating does not crack and peel off when bent, like nickel-plating.

(2) A flexible cannula is shown in Fig. 2, with a Higginson syringe attached to it. For manipulative purposes this instrument is also fitted with a large hollow handle, the end of which is adapted to take the rubber tube of the syringe. The stem is formed of a piece of soft and flexible copper tubing, and the perforated bulb of duralumin. Like the probes it is silver-plated, and is as long as the longest of the probes. The stylet shown at the bottom of the figure is only pushed through the cannula when it is desired to alter its shape, and prevents the formation of kinks in the copper tube. With one of these bulbous probes, bent as required, a deep and irregular wound can be explored with a minimum of pain. With the stylet inserted, the cannula can be bent in a precisely similar manner; the stylet is then withdrawn, the tube of a Higginson's syringe attached, and every portion of



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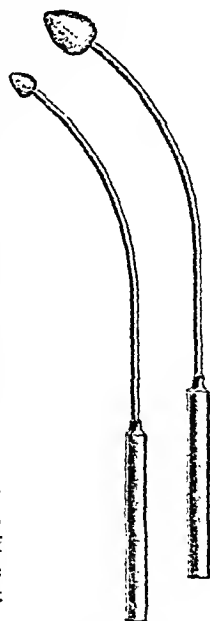


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the wound effectually irrigated. The probes will indicate what length and size of drainage tube is required.

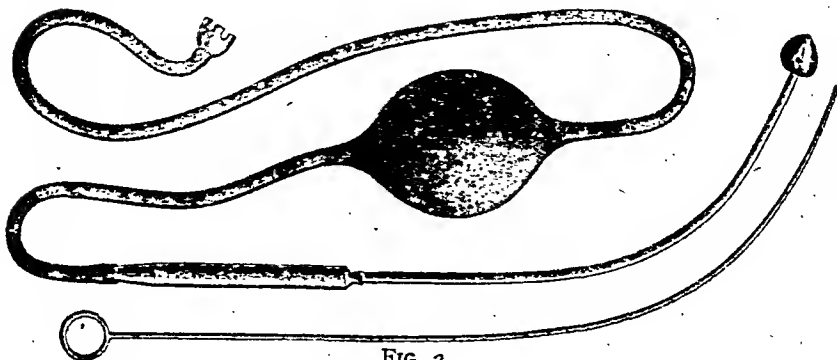


FIG. 2.

The rapid and, as far as possible, painless insertion of dressings into wounds being a matter of importance, the dressing-forceps (Fig. 3) were designed for this purpose. They are the outcome of many years' experience in the after-dressing of mastoid cases, and it goes without saying that the ear, being an extremely sensitive and restricted organ, demands great niceties in the matter of instruments. The loops for the thumb and finger are placed more than one inch apart, an arrangement which gives the surgeon greater control of the distal end of the instrument and lessens the liability to cause pain. By using similar forceps in hospital I have dressed as many as fifteen mastoid cases in half an hour quite painlessly and without any hurry. Even children, from two years of age upwards, rarely give any trouble while their ears are being dressed with these forceps.

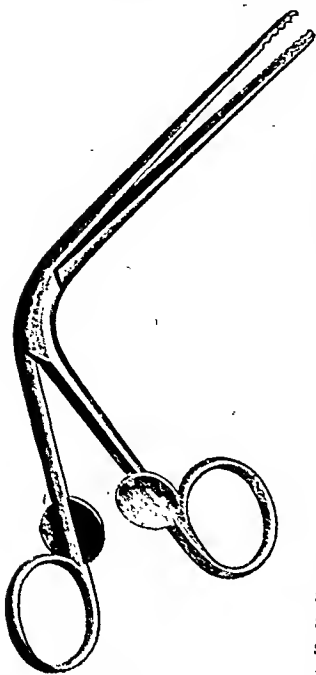


FIG. 3.

They are made of non-rusting steel. The lifters with which they are fitted were designed in order to enable the instrument to be picked up with the thumb and fingers in the position for use, thus saving time. I have forwarded many of these forceps to Red Cross Hospitals in Italy, and a great number of probes. An

Italian surgeon writes me: "Your forceps have been useful for everything, especially for the special double gauze drainage suggested by Sir Almoth Wright, so I have asked X. to send me some more."

I have received numerous communications to the same effect.

The scissors illustrated in Fig. 4 are made of non-rusting steel and are fitted with my lifters to enable the surgeon readily to grasp them in the position for use.

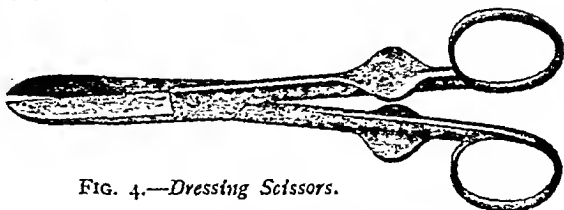


FIG. 4.—Dressing Scissors.

The other instruments are:—

- (1) A mastoid gouge (Fig. 5);
- (2) A combined pericranium raiser and meatus separator (Fig. 6); and
- (3) A tongue depressor (Fig. 7).

These are all made of non-rusting steel; neither blood nor salt will rust them, and lemon juice and vinegar do not tarnish them, whereas the rusting of instruments made of steel of the ordinary kinds entails



FIG. 5.—Mastoid Gouge.



FIG. 6.—Instrument for raising the pericranium and for separating the cartilaginous meatus from the long canal.

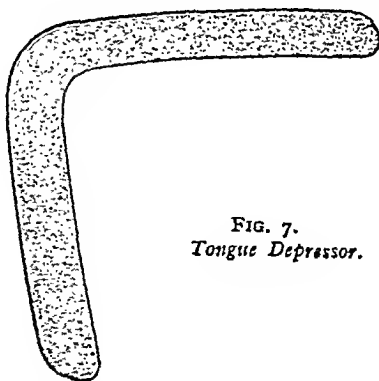


FIG. 7.
Tongue Depressor.

a serious tax upon the funds of our hospitals. These instruments show the various purposes for which non-rusting steel is suitable, but, as far as I can gather, it is not useable for scalpels.

ANTI-DIPHTHERIC SERUM.

London: The Anglo-French Drug Co., Ltd., Gamage Building, Holborn, E.C.

The serum from which these tablets are prepared is polyvalent for the most forms of the *D. diphtheriae* have been used in the immunization process. Each tablet contains about 30 c.g. of serum. They are used in the incipient stage of a diphtheritic attack to clear the throat of infection, and as a prophylactic for those exposed directly or indirectly to infection. One or two are allowed to dissolve slowly in the mouth one hour before taking a meal. They are supplied in boxes containing 5 tubes with 6 tablets in each.

PARA-TETANINE.

London: The Anglo-French Drug Co., Ltd., Gamage Building, Holborn, E.C.

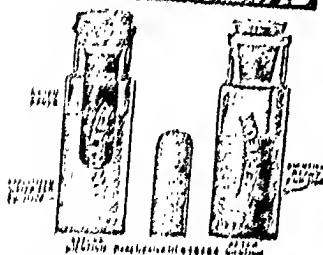
This powder is composed of dried anti-tetanic serum, of great activity, and dermatol. It is found to retain its activity indefinitely, and acts as an haemostatic; the dermatol is bactericidal for the organisms associated with the tetanus bacillus in wounds, which take an important share in the evolution of tetanus. After thoroughly cleansing a wound and removing any foreign bodies present, the contents of a tube of para-tetanine are dusted over the surface so as to cover it completely. The coating of powder is easily removed after being moistened.

THE "INALTER" VIAL.

London: The Anglo-French Drug Co., Ltd., Gamage Building, Holborn, E.C.)

This new introduction provides a most ingenious method of supplying serums in such a way that the contents of the vial keep indefinitely, and, when one is required, a freshly prepared fluid is obtained for use in a very short time. The vial contains 9 c.c. of

INALTER VIAL



carbolized water and a small, U-shaped, yellow glass receptacle holding 1 g. of dried serum. These are both closed by a specially arranged rubber plug, the withdrawal of which causes the dried serum to empty into the fluid. The rubber plug is then replaced and the vial is shaken up, the dry crystals dissolving very quickly. The solution is then allowed to stand for a few minutes, so that any sediment may settle down and not block the needle of the syringe. The serums are produced at the Merieux

Institute at Lyons under the personal superintendence of M. Merieux, and are tested in accordance with the principles in force at the Pasteur Institute.

Anti-diphtheritic, anti-streptococcal, and anti-tetanic serums are supplied in "Inalter" vials.

NEOCAINE-SURRENINE.

A Perfect Cocaine Substitute of Low Toxicity.
Effective and Safe.

"Neocaine-Surrenine gives marvellous results in the operations of extraction, dental anæsthesia, in pulpctomy, and cases of periodontitis."

Odontology: Professor Choquet.

APPLICATIONS.

- 1.—LOCAL ANÆSTHESIA BY INFILTRATION.
- 2.—REGIONAL ANÆSTHESIA.
- 3.—RACHIANÆSTHESIA.
- 4.—ANÆSTHESIA BY EXTERNAL APPLICATION.
- 5.—OINTMENTS, GARGLES, SNUFFS, LOZENGES, &c.

Neocaine is a synthetic product of French manufacture. It is in form of a white powder, belongs to the Benzoyl Dimethyl Ethyl series and is easily soluble in cold water. Neocaine possesses all the therapeutical qualities of Cocaine (excepting as an exhilarant) but only $\frac{1}{10}$ of its toxicity.

The Anæsthetic power of Neocaine is quite equal to that of Cocaine; also its duration and rapidity of action.

Neocaine does not like Cocaine exert a vaso-constrictor action, but is a cardiac tonic. It produces no local irritation if the injection is made aseptically.

"Since the commencement of hostilities we employ Neocaine-Surrenine Corbière which has given us every satisfaction."

Pouchot and Sourdat: Regional Anæsthesia.



Fig. 1.

COMPOSITION OF NEOCAINE-SURRENINE

Pure Neocaine - - - 1 gramme
Borated Adrenalin
Chloride (Takamine) 2 milligrammes
Pure Neocaine can be supplied.

Neocaine-Surrenine may be obtained in—

- * 5 centigramme doses, each in sterilized double capsule: easily pulled apart.
- * Tube containing 10 5-cg. doses of the powder in capsules (Fig. 1).
- Tube containing 5 grammes of the powder.
- " " 2 oz. " "
- " " 1 " " "

* Not suitable for export to hot, humid climates; for this purpose, powder in tubes or solution in ampoules is recommended.

READY-PREPARED SOLUTIONS IN AMPOULES.

CUPRASE

CUPRASE is a colloidal copper hydroxide which is obtained chemically by the reduction of salts of copper in the presence of albumosic acid.

THE MEDICAL TREATMENT OF CANCER.

Revue Moderne de Médecine et de Chirurgie.

As a result of over ten years' research work on Cancer Dr. Gaube du Gers produced a new Colloidal Copper Hydroxide which has given remarkable results in *arresting the progress of the disease*, with loss of pain, and great improvement in the general condition of the patient. Locally, these results are manifested by a transformation of the lesions, leading to their cicatrization, in a greater or less period, to the diminution in their size, and finally to the disappearance of the diseased glands. Cuprase is *not* toxic.

This treatment has passed far beyond the experimental stage. The numerous clinical reports from Doctors of repute in various countries give cases of a great variety. In all of these pain has been eliminated and in a good percentage cures are claimed, and in no instance any undesirable effects.

Extract from Proceedings of the Royal Society of Medicine, February, 1913:—

Dr. GEORGE HERSCHELL, comparing electric and chemical colloid copper, stated: "Chemical colloid appears to give the best results. In the following cases chemically prepared colloid was used. Experimentally it has been proved: (1) That particles of colloid copper can be demonstrated in the granulations of cancerous growths after two or three injections of the colloid; and clinically (2) There is invariably great relief from pain; (3) Appetite and strength return and the patient puts on flesh; (4) There is in many cases a diminution in the size of the tumour; (5) The injections are absolutely non-toxic, although in many cases an inflammatory reaction is manifested in the cancerous growths.

"As regards my own personal experience in the use of this method of treatment in addition to my own cases, I have had an opportunity of observing the effects in the practice of some of my medical friends, and in nearly all cases the progress of the disease appeared to be arrested."

CUPRASE is put up in boxes containing 8 ampoules of 5 c.c. each.

Further Literature on application to Sole Agents for the British Empire—

The ANGLO-FRENCH DRUG CO., Ltd., Gamage Buildings, London, E.C.

Telephone: 1311 HOLBORN. (Late M. BRESILLON & CO.) Telegrams: "AMPSALVAS, LONDON."

ANTI-DIPHTHERITIC TABLETS.

(London: The Anglo-French Drug Co., Ltd., Gamage Building, Holborn, E.C.)

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This new introduction provides a most ingenious method of supplying serums in such a way that the contents of the vial keep indefinitely, and, when one is required, a freshly prepared fluid is obtained for use in a very short time. The vial contains 9 c.c. of

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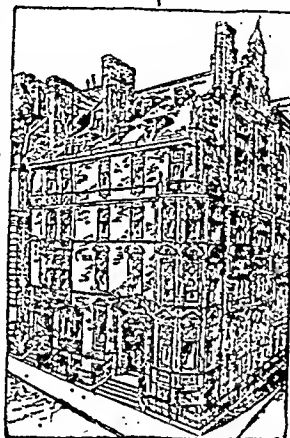
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APRIL, 1917.

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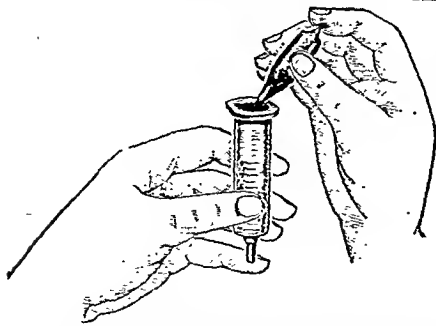
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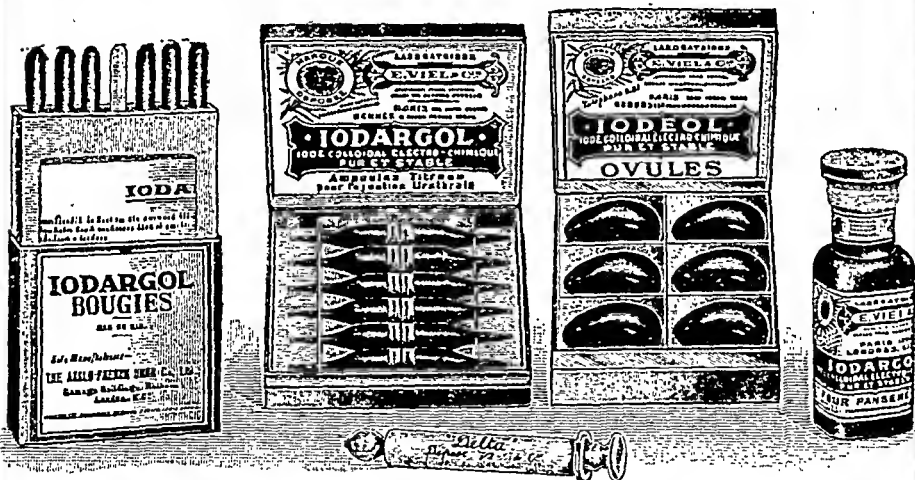
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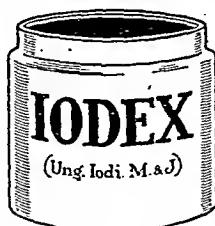
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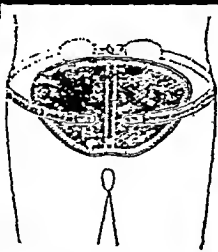
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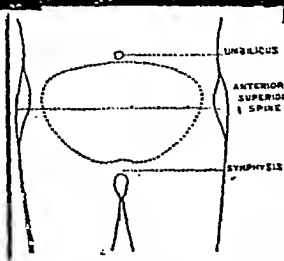
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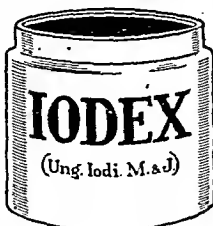
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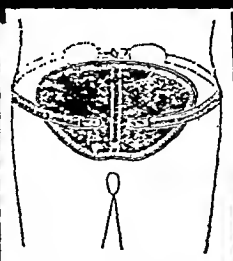
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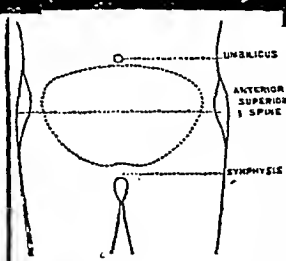
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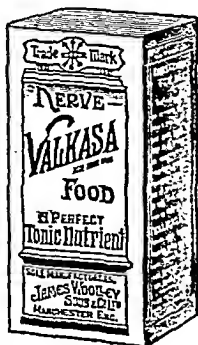
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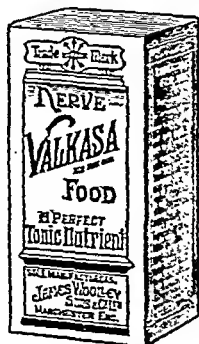
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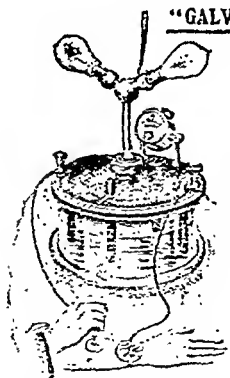
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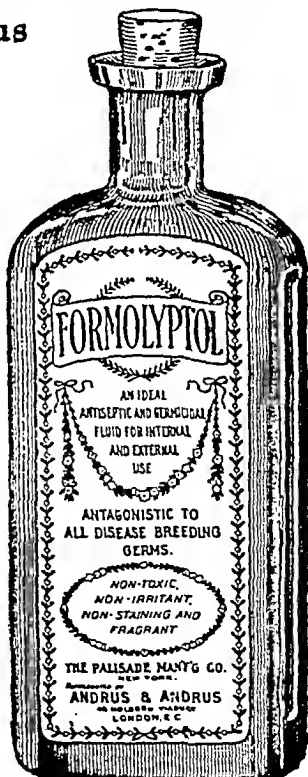
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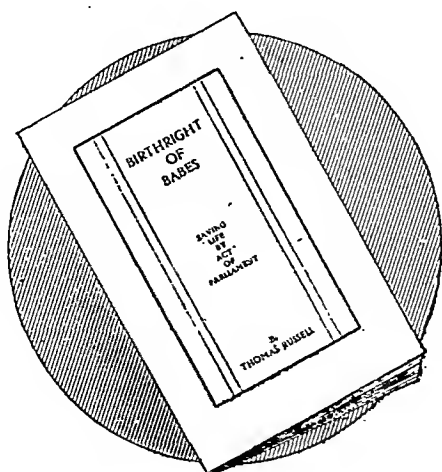
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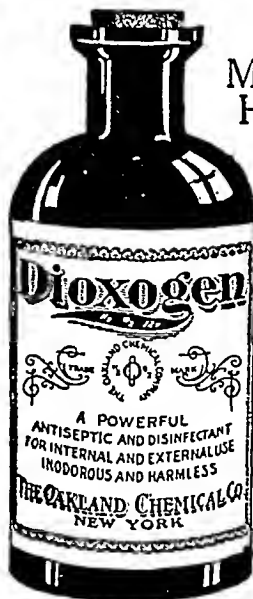
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BENGER'S is the one food which is self-digestive to any extent the physician may prescribe. It is used mixed with fresh new milk (or milk and water) and during preparation, both the food and milk are converted into a delicious soluble cream entirely free from rough and indigestible particles.

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Benger's Food is sold throughout the world by Chemists, &c., in sealed Tins; price 1s., 1s. 6d., 2s. 6d., 5s. & 10s.

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now so widely prevalent under the stress of present conditions, is being treated extensively, and with exceptionally gratifying results, by means of

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Exts. Brain, Spinal Cord, and Lymphatic Glands with Spermin	...	gr. 2
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*Aloin...	...	gr. $\frac{1}{10}$

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The rapid restoration and after maintenance of natural and undisturbed sleep results from the potent neurotonic effect which this preparation produces.

It has been clinically demonstrated to successfully combat Nervous Instability, to allay cerebral hyper-activity and excitability, to re-instate normal metabolic processes, to promote oxidation, to improve the blood state, to supply adequate cellular nutrition and compensation and to secure that balance in the inter-activity of the internal secretions which is essential to normal functioning and to the integrity of the chemistry of the organism.

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"After the administration of 200 of the Lymphoid Compound Capsules the Insomnia has entirely left him and he sleeps soundly and naturally from the time he retires to the time he is called, without any exception."

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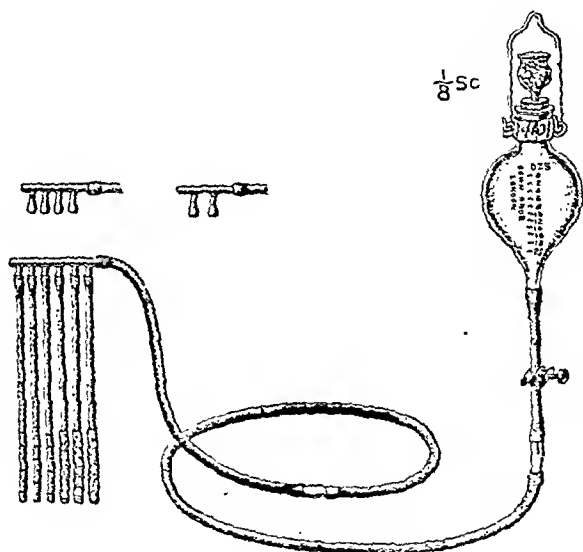
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For the Sterilization of Suppurating Wounds, by the Dakin-Daufresne Solution as demonstrated by Dr. W. O'Neill Sherman (vide *Lancet*, 4th Nov. 1916).



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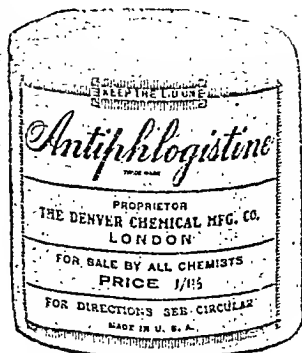
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In Protracted Crisis
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Directions:—Always heat in the original container by placing in hot water. Needless exposure to the air impairs its osmotic properties—on which its therapeutic action largely depends.

The Patient passes from extreme distress and anxiety to a condition of comparative comfort when the attending physician orders

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Applied hot and thick over the entire thoracic wall and changed at least once in 24 hours.

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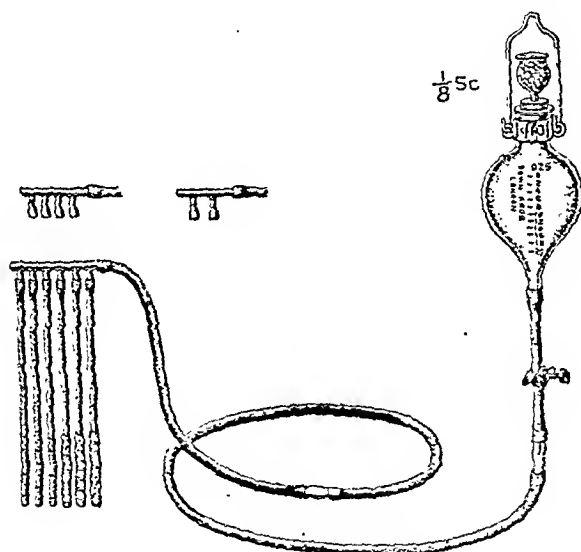
“There’s Only One Antiphlogistine.”

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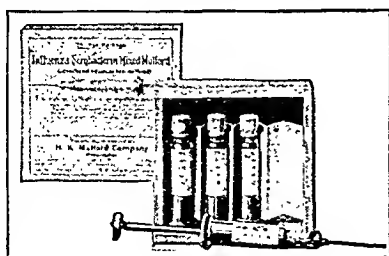
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“An Ounce of Prevention Is Worth a Pound of Cure”

Immunize your patients against Influenza and “Colds” NOW and do not wait until respiratory affections are prevalent.

Influenza Serobacterin Mixed Mulford will give immunity from attacks of “Colds” and influenza



to a large percentage of patients suffering with periodic attacks of disease of the respiratory passages caused by the organisms used in preparing the serobacterin.

Supplied in packages containing four aseptic glass syringes.

Syringes contain killed sensitized bacteria as follows:

	Syringe A	Syringe B	Syringe O	Syringe D
B. influenzae	125	250	500	1000 million
Staphylococcus albus	125	250	500	1000 million
Staphylococcus aureus	125	250	500	1000 million
Streptococcus	125	250	500	1000 million
Pneumococcus	125	250	500	1000 million
M. catarrhalis (group)	125	250	500	1000 million

Literature describing method of treatment and dosage sent on request

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Protosil is a proteid-silver combination possessing very high germicidal power. It is readily soluble in water, is non-irritating, is not precipitated by protoids or alkalies, and does not cause indelible stains. It is supplied in bottles of $\frac{1}{2}$ and 1 ounce.

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Nargol (silver nucleide) exerts a powerful destructive influence upon gonococci; it does not coagulate albumin, and it is practically non-irritating. The bougies are supplied in two strengths (1% or 2%) in boxes of 12.

FOR HYPODERMIC ADMINISTRATION

GONOCOCCUS VACCINE

will prove beneficial in most cases of acute gonorrhœa if excessive auto-inoculation is excluded by rest during the stage of acute inflammation.

In acute gonococcal arthritis, small doses of the vaccine frequently give most striking results; in more chronic cases, gradually increasing doses generally afford relief.

Gonococcus Vaccine, containing either 5 or 50 million cocci per c.c., is supplied in bulbs of about 1 c.c., and in bottles of 25 c.c.

GONORRHOEA PHYLACOGEN

has given very excellent, often brilliant, results in gonococcal arthritis, and other sequelæ of gonococcus infection, such as epididymitis, vesiculitis, cystitis, vaginitis, cervicitis, endometritis, salpingitis, gonococcal ophthalmia, iritis, etc., generally yield to Phylacogen treatment.

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SAW PALMETTO & SANTAL COMPOUND ELIXIR (P., D. & Co.)

This combination is sedative to irritated mucous membrane of the genito-urinary tract, and is of special service in the later stages of gonorrhœa.

These elixirs are supplied in bottles of 4, 8, 16 and 80 fluid ounces.

METHYLENE BLUE COMPOUND CAPSULES (P., D. & Co.)

This combination of methylene blue, copaiba, oil of santal and methyl salicylate possesses a: tipyretic, antiseptic and stimulating properties which render it very beneficial in the earlier stages of gonorrhœa.

These capsules are supplied in boxes containing 12, 25 or 100.

URITONE COMPOUND ELIXIR (P., D. & Co.)

Uritone is a powerful disinfectant of the urinary tract. In this elixir it is associated with soothing, healing and demulcent agents.

SALOL & SANTAL COMPOUND CAPSULES (P., D. & Co.)

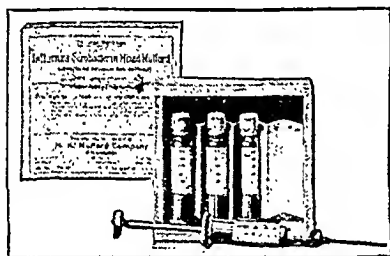
Salol exerts a disinfectant influence throughout the intestinal and urinary tracts. In these capsules it is associated with santal and cubeb, which possess diuretic and stimulant properties.

Further particulars of the above-mentioned preparations will be furnished to any Medical Man by
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“An Ounce of Prevention Is Worth a Pound of Cure”

Immunize your patients against Influenza and “Colds” NOW and do not wait until respiratory affections are prevalent.

Influenza Serobacterin Mixed Mulford will give immunity from attacks of “Colds” and influenza



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The Value of Albulactin in Augmenting the Colloid Element in Cow's Milk.

While the action of reversible colloids in preventing irreversible colloids from coagulation has been understood only in recent years, it has long been known that certain substances prevent the casein of milk—an irreversible colloid—from coagulating in large, thick curds when used for infant feeding.

Recent investigations have shown that the reason why human milk forms soft, highly comminuted flakes in the infant's stomach is because it contains much reversible or protective colloid, in the shape of milk-albumin. Cow's milk contains very little of this substance, hence the large, tough curds it forms in the infant's stomach.

More than this, the problem of artificial infant-feeding is further complicated by the fact that by far the largest proportion of proteid in human milk exists as milk-albumin. Dr. Still's analysis proves this strikingly:

HUMAN MILK (Proteid, 2 per cent.).

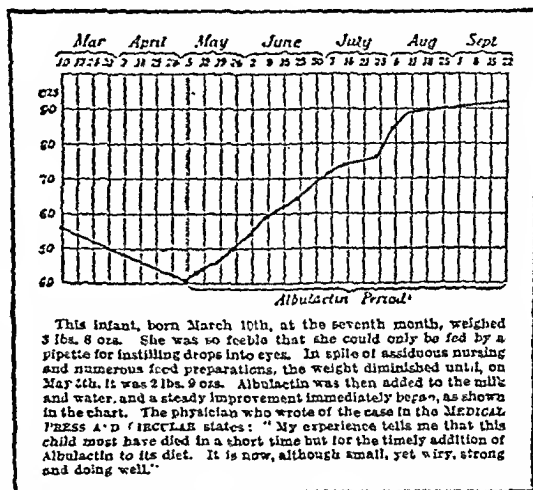
Casein-	-	0.6 per cent.
Milk-albumin	-	1.4 " "

COW'S MILK (Proteid, 4 per cent.).

Casein-	-	3.25 per cent.
Milk-albumin	-	0.75 " "

When the cow's milk is diluted to make the total proteids agree in quantity, the child gets 1.6 per cent. of casein, and only 0.37 per cent. of milk-albumin, or nearly three times more casein than it ought, and only a quarter of the milk-albumin.

If the milk is further reduced to make the casein proportion correct, the milk-



albumin is reduced to about one-tenth of what it ought to be.

The solution of the infant feeding problem, therefore, resolves itself logically into the addition of sufficient milk-albumin to supply the necessary protective colloid and to furnish enough easily-digested proteid.

This is admittedly now done in the best and simplest way by the addition of Albulactin. On this subject a physician has written in *The Lancet*: "The method of milk modification by means of Albulactin is preferable to and more reliable than the use of citrated milk, peptonised milk, cream and whey feeding, and all other plans which have been adopted to meet the frailty of infantile digestion."

Practical evidence of the value of Albulactin, even in the most severely handicapped cases, is shown in the above chart. The British Purchasers of the Sanatogen Co. (Chairman: Lady Mackworth), 12, Chenies Street, London, W.C., will send samples of Albulactin and literature to all physicians who write for them.

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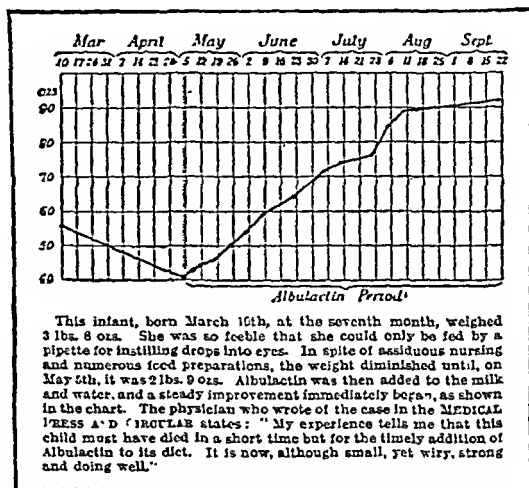
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Digestive Tonic and Hæmatinic

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Supplied in bottles at 2/3 each

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Vitalising Tonic

CALCULATED to produce the best results obtainable with glycerophosphates upon the nervous system. Each fluid ounce contains gr. 4 of calcium glycerophosphates and gr. 2 of each of the glycerophosphates of potassium, sodium and magnesium.

Supplied in bottles of two sizes at 2/2 and 4/0 each



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The product is easily inserted and, once past the sphincter muscle, cannot be expelled. Special care is taken with the packing to prevent deterioration and contamination.

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Sept. 2, 1916.

Re Ambrine Treatment.

"The primary and quite incontestable advantages of the treatment are two: it is agreeable to the patient, because entirely painless; it is convenient to the surgeon, because easily and quickly applied. It is possible that the treatment would be useful in dealing with ordinary ulcers, and in any case it is certain that the study of its application to raw surfaces is worth pursuing . . ."

"The Lancet," June 10, 1916.

The value of Ambrine in the Treatment of Wounds.

"Attention is being drawn to the remarkable success of the Ambrine Wax Treatment now being used at the hospital St. Nicholas, at Issy-les-Moulineaux, for burns, frozen feet, and all wounds where the tissues have been so damaged as to exact great length of time and considerable disfigurement in their restitution by the usual means. The Minister of War in reply to the deputy, M. Mons, as to why, in view of the marvellous results obtained by treating burns and frost bites with Ambrine at the Hôpital St. Nicholas, all the soldiers suffering from such wounds were not sent there, stated that this was being done as far as possible. . . ."

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THE PRACTITIONER.

APRIL, 1917.

OBSERVATIONS ON OPERATIONS FOR APPENDICITIS.

BY JOSEPH E. ADAMS, M.S., F.R.C.S., CAPT. R.A.M.C. (T.).

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OWING to the enormous mass of literature which is in existence concerning this small and degenerate portion of the body, it is quite usual for writers on this subject to apologize for troubling their readers with such a tedious topic. However, as appendicitis is by far the most important factor in the surgery of the whole abdomen, there is little need for apology, and the following remarks, based upon a fairly wide experience, dealing with points which are of practical importance, may prove of some interest to those who have to take charge of these cases and gather their experience as they go. He is a very ordinary kind of mortal who has to learn everything by his own experience, and such education usually means that his most instructive lessons have been the result of "bitter" experience. It is characteristic of human nature that we learn more by our mistakes than our successes, but it is doubtful if it ought to be so, and the really happy surgeon is he who learns by the misfortunes of others and the successes of his own practice.

The controversy that raged in the medical journals a year or two ago under the title, "When to operate in Appendicitis," appears to me to be on the way to settlement, and the final decision does not rest so much with the medical profession as with the laity. I was much impressed recently by the mother of a child I saw in hospital. Having examined her little boy and diagnosed appendicitis, I was proposing to enter into the reasons for operating at once, when she immediately cut me short with the remark, "Well, if he's got appendicitis, of course, he must be operated

upon." Delay, to her mind, was as much out of the question as it was to mine, and, therefore, no time was lost. The result of this mutual understanding was most satisfactory to the patient, who was up and about again in a fortnight, rejoicing in the appendix-less state.

The only solid argument that has even been adduced against these rapid tactics is, that the surgeon will frequently remove a normal appendix for some dietetic error or abdominal pain of obscure origin, and thus the patient will undergo an unnecessary operation. Herein lies the value of a purely medical opinion, and one of the uses of the physician in such cases was supposed to be that he restrained the too eager surgeon from appealing to the knife, both for diagnosis and treatment. Now, it is reasonable to suppose that the man who is constantly seeing and handling the abdominal viscera, should have a just appreciation of the external signs when those viscera are diseased; surely, therefore, the abdominal surgeon may be relied upon to hold his hand in doubtful cases. Accuracy of diagnosis and general improvement in surgical technique have now advanced so much that appendicectomy has become an operation of minor surgery, and there is no longer any need for the physician to diagnose or the surgical specialist to operate. The general practitioner diagnoses the case, and treats it in the only proper way by operation. This is all for the good of the patient, since it eliminates dangerous delay, and the operator is brought to the patient and not *vice versa*.

These circumstances, I think, are sufficient justification for considering some of the important details of operation in cases which are so numerous that difficulties must be met with sometimes.

Operations for appendicitis are performed in the "quiescent period" or the "acute stage." In the former, the operator has some choice in fixing the time of his operation; in the latter, his hand is forced by the state of the patient. It would be simpler to refer to these operations by the one term "appendicectomy," but I am convinced that it is quite wrong to set out with a determination in *every* case to remove the appendix, and it is equally wrong to consider that removal of the appendix *always* completes the operation. Removal of the appendix occasionally requires risks, which

are undesirable and dangerous to the life of the patient; removal of the appendix alone, without dealing with adjacent lesions, sometimes fails to cure the patient.

OPERATION IN THE QUIESCENT PERIOD.

By such a term as this, we usually understand opening the abdomen by whatever route the operator prefers, delivery of the cæcum into the wound, identification of the appendix, its removal with invagination of the stump, and closure of the abdomen in layers. This procedure can be done easily in twenty minutes or less. However, it is universally recognized that the subsidence of physical signs does not always mean an easy operation, and one must be prepared to meet a "difficult appendix" even when operating at the time of one's own choice after an attack. The source of trouble and difficulty in such cases lies in the presence of adhesions which affect the cæcum, binding it to the posterior abdominal wall, and rendering its delivery into the wound difficult; or the appendix itself may be fixed to the cæcum, small intestine, or abdominal wall, and adhesions may even cover it so that it is practically hidden from view and lost to touch. These difficulties only amount to a trial of the surgeon's patience and mean a longer operation, assuming that the operator is accustomed to the handling of peritoneal adhesions, and possesses that deftness of touch which distinguishes between the inflammatory bands which can be broken down and those which require ligation and division with the knife or scissors. The risk of a fæcal fistula ought to be negligible in operation for quiescent appendicitis.

CHOICE OF INCISION.

There can be little doubt that Battle's incision by displacement of the rectus muscle inwards gives the best and safest route for appendicectomy, and it provides as well ample room for inspection of adjacent viscera. As far as I am aware, it is only open to one objection, namely, that when the posterior sheath of the rectus is divided vertically, the lower intercostal nerves may be endangered and divided, and this may be followed by a segmental atrophy of the rectus, leading to local weakness and bulging of the abdominal wall. This is more cogent in theory than in

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In operating through the rectus sheath, it is important to remember that the incision is not directly over the cæcum, and, therefore, the fingers must be directed downwards and outwards, especially outwards, to secure the desired portion of bowel. The identity of the cæcum is ascertained by noting that it has longitudinal muscular bands, no great omentum, but occasional appendices epiploicæ attached to it, and, lastly, the ileum ending in it is the best assurance, for the ileo-cæcal junction forms the guide to the cæcal end of the appendix. When the appendix is not adherent to any structures except the cæcum, delivery of this piece of the gut brings the appendix fully into view, and half the operation is over. In those cases in which the appendix is covered with a sheet of peritoneum hiding it from view, it can still be felt between the finger and thumb if the cæcum is pulled firmly into the wound, and blunt dissection will usually bring a part of it into view. When the whole length of the appendix has been seen or felt, adhesions may be dealt with, divided between ligatures where necessary, so that the gut is rendered free and mobile. Its mesentery then requires to be ligatured and divided, especial care being taken to secure the vessels at the cæcal end.

The precise steps of amputation of the appendix and the burying of its stump in the wall of the cæcum vary with the idiosyncrasies of the surgeon, but the use of the appendix clamp has much to recommend it, and renders the steps of ablation very simple. The burial of the appendicular stump is most easily effected by pleating the wall of the cæcum vertically with a short continuous sero-muscular stitch, and then tying the two ends of this suture together so that the stump is doubly invaginated. This does away with such unnecessary instruments as the "appendix tucker," and the surgeon does not rely upon his assistant to invaginate the stump at the psychological moment, as required by the circular purse-string method. It is then necessary to cover over any raw areas remaining with one or two silk stitches; these are only occasionally required.

The next step of the operation involves a close inspection of the lower end of the ileum and a search for the presence of abnormal bands or kinks, as described by Arbuthnot Lane. To what extent these bands are of pathological importance

practice, but the risk can easily be guarded against by a horizontal division of the posterior sheath of the rectus and peritoneum. Personally, I have been in the habit for a number of years of noting the course of the intercostal nerves, nicking the posterior sheath and the peritoneum held up in toothed forceps, and then enlarging the opening so as to insert two fingers, splitting the peritoneum in the horizontal direction. For all ordinary cases, this gives perfect access to the region of the cæcum, and if more room is required, the edges of the opening can be cut as far as the line of the nerves; in a very few cases, it is necessary to divide beyond them either in an upward or a downward direction. In placing the skin incision, it is necessary to remember that the rectus stretches about half-way from the umbilicus to the anterior superior iliac spine, and the primary incision should be either vertical or oblique and fairly near to the umbilicus so as to be well on the inner side of the linea semilunaris. One occasionally sees incisions made in this line, but that is highly undesirable. One still sees McBurney's incision adopted for interval appendicectomy, but it has no advantages over Battle's incision, unless a small scar and a scarcely visible skin incision are matters of concern to the surgical mind, which, in the case of the abdominal wall, appears ridiculous. Muscle splitting incisions are excellent, but, for routine appendicectomy, McBurney's incision has many drawbacks, not the least of which is the difficulty of securing adequate room in difficult cases, and also one sees these cases followed by right inguinal hernia, which, I think, is due to upsetting the neuro-muscular arrangement of the inguinal canal.

STEPS OF THE OPERATION.

One ought not to have to mention any details with reference to the search for the appendix, but, nevertheless, I have had to do with four cases during the last twelve months in which the appendix has not been found. There is only one type of appendix which, in interval cases, ought to give rise to difficulty, and that is one in which the organ is buried in adhesions and covered by a sheet of normal-looking peritoneum—in reality of inflammatory origin—but perhaps we may do well to consider the steps of the operation.

entero-spasm affecting the lower end of the ileum. This is of variable degree, and to what extent it is dependent on the presence of an adherent or diseased appendix is uncertain. I have frequently seen it in quite a pronounced degree in the absence of any kink or bands connected with the lower ileum, and the appropriate treatment is probably medical rather than surgical.

When these more adjacent structures have been investigated, the attention of the operator will naturally be directed to an examination by palpation, and by inspection, where possible, of the uterine appendages, right kidney, and gall-bladder, though the latter may be difficult to reach. If other organs lie under suspicion, the incision must be enlarged accordingly, and a complete investigation made.

As to the question of appendicectomy in all cases, it is almost certain that even when one is operating in what is regarded as a quiescent interval, there will be encountered cæca which are practically immovable owing to the density of local adhesions, and appendices which could only be removed at great danger of tearing bowel and causing local infection or leaving faecal fistulæ. These remarks apply especially to cases in which abscesses have been drained, or when an inflammatory mass has been present but has apparently subsided. Two cases of this description have recently occurred in my own practice, which illustrate the value of temporary drainage of the cæcal region for the relief of adherent peritonitis.

CASE 1.—Miss S., aged 27, had had two attacks at an interval of five months before I saw her. Examination two months after the second attack revealed a resistant mass apparently behind the cæcum, with some tenderness in the right iliac fossa and in the loin. Temperature was normal, the pulse 68, tongue clean, bowels acting regularly. She was kept under observation for a week, during which the temperature never rose above normal and the mass lessened materially in size, though it did not disappear entirely. At operation in May, 1915, I found a very hard infiltrating mass binding the cæcum down to the posterior abdominal wall, and the appendix was so buried that its cæcal end could only just be felt. I judged it inexpedient to attempt removal of the appendix, which would have been a difficult and dangerous operation, and a rubber tube was, therefore, left protruding from the abdominal wound, leading from the mass to the exterior. There was a good deal of offensive discharge for some days, but the tube was gradually shortened, and completely withdrawn about ten days after operation. The wound

is a subject of controversy. Certain it is that if they are looked for, they will frequently be found in the form of a strengthening or thickening of the attachment of the lower portion of the ileum to the pelvic wall, in some cases producing a definite kink of the ileum within a few inches of the ileo-cæcal valve. It is generally agreed that they should be removed, and that no appendicectomy is complete unless the "run" of the ileum into the cæcum is left straight and unobstructed. To an unprejudiced observer, it seems clear that all that has been said and written about ileal stasis is not true, nor is it found that all cases of chronic constipation with perfectly definite bands in this region are cured by their removal; nevertheless, since they are potential causes of trouble, I believe it is the duty of the surgeon to leave the ileum so that the last portion does not run sharply up-hill to join the cæcum, and this can be done by removal of the bands between ligatures. Even when there is no definite kink of the ileum, the bands should be removed.

Another structure, which has recently acquired importance, is Jackson's parieto-colic membrane. This should be looked for in the shape of a thin veil of peritoneal tissue, covering the lateral portion of the cæcum and ascending colon, passing from the anterior tænia muscularis to the postero-lateral abdominal wall. It is very slightly vascular, but should be divided between ligatures in successive portions from below upwards to guard against its re-formation, and to release the sacculæ of the cæcum and colon, the movements of which it appears to inhibit. It is certainly a much rarer phenomenon than Lane's band; by some authorities, it is considered to be inflammatory, by others developmental. Whatever its ætiology, it is certainly of pathological importance in some cases, and there is little doubt that it should be carefully removed, when it is encountered, to ensure the mobility of the cæcum and ascending colon. There is a good deal of clinical, skiagraphic, and operative evidence that it may be responsible for colic stasis.

It is true that the incision which I have described is hardly adequate, without enlargement in the upward direction, to give access to the whole of such a structure as Jackson's membrane, but this extension of it is quite easy.

Another condition, not uncommon in these cases, is

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Another condition, not uncommon in these cases, is

that the anti-bacterial action of the peritoneum is greater by far than that of mere muscle and connective tissue.

OPERATIONS IN ACUTE STAGES.

It is important that a rough classification of the clinical manifestations of appendicitis should be made by the surgeon who is going to operate, because his plan of procedure will depend very much on his clinical estimate of the requirements of the case. To come suddenly upon an abscess and let pus freely into the peritoneal cavity means a grave risk to the patient's life; in all abdominal operations, it is of great advantage to know beforehand what will have to be done. The simplest distinction to be drawn is between those cases in which the disease, however acute the stage may be, appears to be limited to the appendix, and those in which signs of peritoneal infection are manifest. The appendix may be gangrenous for its whole extent and greatly swollen, but if it is not perforated, there is a strong probability that gross infection has not reached the surrounding peritoneum. I believe it to be useful to the operator to attempt clinically to diagnose between the perforated and non-perforated appendix, for the latter may be dealt with in much the same way as an interval case, but the former calls for special consideration as to the details of peritoneal toilet.

If it is decided that the inflammatory process has extended beyond the limits of the appendix, we may have to deal with a localized abscess, or with local or general peritonitis. The two latter cannot easily be distinguished from one another, since the question is one of degree only. Even when operation has been performed, the area of peritoneum which comes under observation does not readily warrant a distinction between local and general peritonitis, and the mischievous exploratory incision, to see if the infection is general, needs only to be mentioned for condemnation.

Roughly speaking, then, the surgeon operating in one of the acute stages of this disease has to cope with one or other of three phases :—

1. Inflammation limited to the appendix.
2. Abscess around the appendix limited by inflammatory

was not quite closed when the patient left the nursing home at the end of a further fortnight. Some ten weeks later, she returned for appendicectomy, and, at the second operation, there were no troublesome adhesions; the cæcum was easily delivered, and the appendix was removed in a few minutes, after the scar tissue had been excised and the peritoneal cavity re-entered. There was evidence of former perforation of the appendix. Convalescence was uneventful.

CASE 2.—Mr. A., schoolmaster. Similar in all essential points to the above, except that there was thought to be a small abscess at the first operation. However, it was found that the appendix lay buried beneath the cæcum, which was firmly adherent to the upper part of the pelvic wall, and no pus could be discovered. A tube was left down to the *caput cæci*. There was some purulent discharge, not offensive in character, for a few days, and the tube was replaced by a gauze plug six days after operation. There was then very little of the inflammatory lump to be felt, and the tenderness in the right iliac fossa had disappeared. The wound was healed at the end of three weeks, and the patient was instructed to return for appendicectomy in six weeks' time. This he did, and, at the second operation, the cæcum was quite free and easily brought up into the wound. The appendix was retro-cæcal and firmly adherent to the cæcum, but its removal occasioned no trouble; it exhibited chronic thickening and an old perforation. Healing by first intention was obtained, and the patient left the nursing home about a fortnight after operation.

These two cases are of special interest, for they afford proof of the value of drainage of the cæcal region in the resolution of adhesions, when rest and medical treatment had entirely failed.

CLOSURE OF THE WOUND.

The closure of the wound is a very simple matter, when horizontal division of the posterior sheath and the peritoneum has been practised, for three or four sutures easily suffice to bring the edges together; the muscle falls back in its place and covers the peritoneum completely, and stitches are then applied to the anterior sheath and skin. The suture material is of little importance, whether it be silk, linen thread, or catgut, but if there is reason to fear stitch-sinus formation, catgut should be used. This applies in particular to those cases operated on after the drainage of an abscess, for organisms lie dormant in the planes of the abdominal wall for lengthy periods, and supuration entirely outside the peritoneum may take place in the wound of the operation for appendicectomy—a proof

is whether there is a definite abscess present, or whether it is an inflammatory mass without pus. If it is an abscess, a diagnosis usually made on the length of the illness before the surgeon is consulted, it is important to ascertain before operating whether the pus is likely to be reached before opening the peritoneal cavity. If very light percussion reveals a dull area, this may usually be taken as evidence that pus is close to the surface, and, after separating muscle fibres, the abscess can easily be opened with a blunt instrument. All that remains to be done is to explore the abscess cavity very gently with the finger, and insert a drainage tube of suitable calibre, which just reaches the lowest part of the space to be drained.

When the abscess can only be reached across the general peritoneal cavity, there will be no dull spot on percussion to serve as a guide to the site for incision, which should then be made over the most prominent part of the swelling. As the peritoneal cavity is entered, the intestine will be packed off by means of gauze plugs, and between these the finger may be pushed on to reach the abscess.

The question of appendicectomy in cases of localized abscess is one which often has to be settled at the operation, since hard-and-fast rules of procedure are not to be recommended, but it may certainly be considered that if the peritoneal cavity has to be crossed to reach an abscess, very little more disturbance will be caused by dislodging and removing the appendix. On the other hand, it should always be remembered that if removal of the appendix is difficult, it is also dangerous; therefore, in the presence of free pus, no prolonged efforts are permissible to dislodge an adherent appendix, but if it lies free, or nearly free, in the abscess cavity, removal may frequently be undertaken with perfect safety, and thus the patient will be saved a second operation and a double period of convalescence.

When an abscess is expected but no pus is found, a tube left down to the inflammatory mass will be all that is required. Pus usually discharges about the third day, and resolution of the mass begins, as in the cases described above in some detail.

REMOVAL OF APPENDIX AFTER DRAINAGE OF ABSCESS.

This is a procedure which is almost universal, and it is

adhesions.

3. Inflammation around the appendix, which has spread to a part or the whole of the peritoneal cavity.

The importance of diagnosing the last type of infection is to enable a correct and rapid technique to be employed, and a suitable prognosis given to the friends.

FOR ACUTE INFLAMMATION LIMITED TO THE APPENDIX.

When this diagnosis has been made, it appears to be the ideal time to remove the appendix. The reasons are two-fold: first, it is an operation of no greater risk than appendicectomy in a quiescent interval; secondly, it does away with the complications of localized abscess and peritonitis, local or general. Their mortality will necessarily cease to figure in appendix statistics, except in those cases in which the spread of infection is so rapid that the medical man is not summoned until a grave condition has been reached. This represents the main arguments as to the desirability of immediate operation, when the diagnosis has definitely been made, and coincides, so far as I am able to judge, with the desire of the enlightened lay public.

With regard to the operative details of treatment at this stage, it may be said that they do not differ from those appropriate to the interval operation. The question of drainage will sometimes crop up, but, given the condition I have predicated, I do not think it is ever necessary to drain the peritoneal cavity, even for a short period. If any vent is required, a split rubber tube can be inserted beneath the rectus muscle, thus giving drainage to the abdominal wall and not to the peritoneal cavity, and such drainage may be a wise preventive measure. As a matter of fact, in a small proportion of cases treated in this way there is a slight purulent discharge for several days; when it occurs, it amply justifies the use of the rubber drain, for, without it, a troublesome, and sometimes dangerous, cellulitis of the abdominal wall may be met with.

FOR LOCALIZED APPENDICULAR ABSCESS.

In those cases in which there is a lump, sometimes visible, sometimes palpable, and sometimes both to be seen and felt, in the region of the appendix the question which arises

is whether there is a definite abscess present, or whether it is an inflammatory mass without pus. If it is an abscess, a diagnosis usually made on the length of the illness before the surgeon is consulted, it is important to ascertain before operating whether the pus is likely to be reached before opening the peritoneal cavity. If very light percussion reveals a dull area, this may usually be taken as evidence that pus is close to the surface, and, after separating muscle fibres, the abscess can easily be opened with a blunt instrument. All that remains to be done is to explore the abscess cavity very gently with the finger, and insert a drainage tube of suitable calibre, which just reaches the lowest part of the space to be drained.

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REMOVAL OF APPENDIX AFTER DRAINAGE OF ABSCESS.

This is a procedure which is almost universal, and it is

only fair to warn patients, whose abscesses have been drained, that they must not consider themselves well until the appendix has finally been removed. The date at which it is safe to do the second operation cannot be arbitrarily laid down, but, personally, I prefer to wait six weeks after the abscess wound has healed. By this time appendicectomy will be easy, if it is ever going to be in any given case, since this period allows ample time for the absorption of inflammatory tissue. To wait too long lays the patient open to the risk of a recurrent attack of appendicitis. If symptoms recur before the date fixed for the second operation, immediate interference is indicated, but this does not necessarily mean immediate appendicectomy, which should only be done if it is easy. If it is difficult, temporary drainage to aid the absorption of adhesions is the safest course, with appendicectomy later on.

With regard to the choice of incision for a secondary appendicectomy, this will vary with the primary wound. If a muscle-splitting incision was used in the first instance, and there is evidence of weakness of the scar, this should be excised, and, after the appendix has been removed, suture of the muscular planes can be carried out by overlapping them, as in the cure of ventral hernia. If the original spanning incision is sound, it is quite satisfactory to remove the appendix through a rectus sheath incision. If the latter route was used for drainage of the abscess, appendicectomy is best performed through the scar.

APPENDICITIS WITH PERITONITIS.

Such peritonitis may be clinically "local" or "general." Whilst such a distinction makes a great difference in the prognosis, the steps of the necessary operation are the same, and I believe that the result depends largely on the rapidity with which the appendix is removed and the general intra-abdominal tension lowered by effective drainage. It is a good plan to have the head-end of the operating table raised a little, so that the patient's pelvis is low, and any exudate disturbed during operation is encouraged to pass out by the incision or into the pelvic basin. The quickest route is through the rectus muscle, and this involves no cutting of its fibres; if nerves of the rectus muscle are

encountered, they may be sacrificed to the demand for speed in the operation.

It appears that the factors, which make for success in operating on these cases with greater or less degree of serious peritoneal infection, are rapidity of operating and the limitation of the manoeuvres to the region of the appendix. The peritoneal cavity is so extensive, that it cannot be completely cleansed either by sponging or lavage, nor can it be drained in all parts or for any length of time; therefore, local drainage or pelvic drainage are the only really practical steps, and this, combined with after-treatment by proctoclysis in the Fowler position, yields the most satisfactory results. I am convinced that the actual duration of the operation, more especially of the period of anæsthesia, has an important influence on the prognosis, and, therefore, much time should not be spent in packing off the more healthy peritoneum with gauze pads, though prolapse of bowel should be prevented in this way, and the operation conducted in the quickest way consistent with its limitation to the right iliac fossa.

As regards the anæsthetic, there seems little doubt that gas and oxygen is the best for use in all septic cases, and, speaking generally, one may say that the further one gets from the use of chloroform, and the shorter the period of anæsthesia, the better the results. One must not omit to mention the value of spinal anæsthesia and local analgesia as important factors in the elimination of shock from abdominal, and especially acute abdominal, operations.

I believe the statistics of all general hospitals show a great improvement in the mortality of appendix cases, and I think the factors which have determined this are the earlier date of operation and the improved conditions of anæsthesia, coupled with more general improvement in surgical technique.

only fair to warn patients, whose abscesses have been drained, that they must not consider themselves well until the appendix has finally been removed. The date at which it is safe to do the second operation cannot be arbitrarily laid down, but, personally, I prefer to wait six weeks after the abscess wound has healed. By this time appendicectomy will be easy, if it is ever going to be in any given case, since this period allows ample time for the absorption of inflammatory tissue. To wait too long lays the patient open to the risk of a recurrent attack of appendicitis. If symptoms recur before the date fixed for the second operation, immediate interference is indicated, but this does not necessarily mean immediate appendicectomy, which should only be done if it is easy. If it is difficult, temporary drainage to aid the absorption of adhesions is the safest course, with appendicectomy later on.

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I have been much struck by the number of cases of excessive amount of mucous or muco-purulent discharge in which I have been asked to curette, or have been consulted after curetting has been carried out. A mucous or muco-purulent discharge of sufficient quantity to make the patient complain of it is very seldom due to a morbid condition of the endometrium of the body of the uterus. Careful questioning may elicit the fact that there is an abnormal amount of discharge other than blood in some cases of submucous fibroids, and of "endometritis," with or without retroversion of the uterus, but the importance of this symptom is outweighed by that of the bleeding. In other cases, there may be a more profuse discharge for which, on careful examination, no cause can be found except anæmia and constipation. In most cases, however, the cause will be found in the condition of the cervix.

If the cervix has not been lacerated, an erosion or a mucous polypus with an hyperæmic and thickened condition of the cervical endometrium will be seen, but usually the cervix is found to have been more or less deeply torn, with thickened lips and much exposure of cervical endometrium. Like other delicate epithelial surfaces which are not meant to be exposed, this mucous membrane becomes thickened and hyperæmic, chronically inflamed, and discharges an excessive amount of secretion. The usual treatment given to patients with such a cervix is douching, probably with a solution containing tincture of iodine or carbolic acid, and, after a variable length of time, when douching has been proved to be useless, curetting. Douching can do no good in these cases, except by washing away any secretion which is not too tenacious; curetting not only does no good, but it may do much harm.

It is a common occurrence in hospital and consulting practice to meet patients who say that all they complained

SOME OF THE EVILS OF CURETTING.

BY HENRY RUSSELL ANDREWS, M.D., B.S., F.R.C.P.

Obstetric Physician to the London Hospital, etc.

WITH the increased safety of operations in general, there has come a danger of certain operations being performed on inadequate grounds, as well as for conditions in which their performance is not indicated. One of the best examples of this is curetting the uterus, for which it is thought that no special training or experience is necessary. Curetting is an excellent operation in certain conditions, *e.g.*, excessive bleeding due to sub-involution ; as a diagnostic measure in cases of bleeding at about the time of the menopause, or after this epoch, when carcinoma of the body of the uterus is suspected, too early to be detected by the finger inserted into the uterus ; in corporeal endometritis ; after removal of sub-mucous fibroids, or of fibroid or mucous polypi ; in some cases of dysmenorrhœa ; and in some cases of sterility and of repeated abortion for which no adequate cause can be found.

If curetting were reserved for these cases, it would be one of the most beneficial of minor operations. When performed for unexplained uterine hæmorrhage, except as a diagnostic measure, it is a most disappointing operation, although it probably does no harm. It is, however, frequently performed on account of pain, apart from dysmenorrhœa, in which case it is difficult to understand how the most sanguine operator could expect any benefit to result, except from the effect of suggestion and a week's rest in bed. Such a so-called indication serves to justify to a certain extent the definition of gynæcological treatment given by a general surgeon, *viz.*, that it consists of giving a patient a ring pessary if she complains of pain in the pelvis, and curetting her if the ring does not cure her. It is by no means rare to meet a patient who has been curetted three or four times with no benefit, the only good thing that could be said about the treatment being that it had done no evident harm.

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of, before they were curetted, was a discharge which made them uncomfortably moist, caused a certain amount of irritation, and sometimes necessitated the wearing of a napkin. Since the curetting, on the other hand, they have had aching pain in the pelvis and back for several days before the menstrual periods and excessive bleeding at the periods, while there has been no diminution of the intermenstrual discharge. These fresh symptoms are to be attributed to an upward spread of infection from the cervix to the body of the uterus, and often to the Fallopian tubes, as the result of the curetting.

During the last year, I have had under my care two cases which illustrate the graver results of curetting. In the first, a patient of 43 was curetted on account of a purulent discharge. I saw her three months later and found a severe pelvic inflammation, mainly cellulitis, with a very large hard mass of exudate. After prolonged treatment the exudation was absorbed to a large extent, but the mobility of the uterus was diminished and the patient experienced pain, at the menstrual periods, of such severity that eventually I removed the uterus. In the other case, a woman of 25 was curetted for no adequate reason and pelvic inflammation followed, in this case chiefly peritonitic. After rest in bed and appropriate treatment, the acute symptoms cleared up, but there have been several months of invalidism, with the strong probability that the patient is sterile from the results of tubal inflammation.

The cure of a profuse discharge from a lacerated everted cervix, or chronic cervicitis to use the popular hybrid term, must be brought about by treatment applied to the exposed cervical mucous membrane. In the less severe cases, application of pure carbolic acid on three or four occasions may effect a cure. In more severe cases, scraping the exposed cervical mucous membrane with a sharp curette under anæsthesia and twisting off mucous polypi, if present, followed by application of pure carbolic acid, is sometimes effective. In the most severe cases, however, the benefit accruing from this treatment is only temporary, and the best treatment for a deeply-split cervix with much eversion is repair by trachelorrhaphy or amputation.

SCOPOLAMINE AND MORPHINE IN LABOUR.

AN EXPERIENCE OF SEVENTY CASES IN PRIVATE PRACTICE.

By R. W. JOHNSTONE, M.A., M.D., F.R.C.S., M.R.C.P.

*Assistant to the Professor of Midwifery in the University of Edinburgh ;
Extern-Assistant Physician, Royal Maternity Hospital, Edinburgh ;
Obstetric Physician, New Town Dispensary, Edinburgh ;
Examiner to the Central Midwives Board
for Scotland.*

THE perusal of the eight papers on "Twilight Sleep" in the January, 1917 number of THE PRACTITIONER leads me to believe that a short record of my experience may be of interest to others, and possibly helpful. That experience has, at any rate, been fairly extensive, for since 1908, when Sir Halliday Croom first began to try it in the Royal Maternity Hospital of this city, I have not only used it more and more in practice, but have been privileged to observe its employment in the majority of his private cases as well. In those eight years, I think that between hospital and private work, I must have seen more than two hundred cases in which scopolamine and morphine have been administered. As far as statistics are concerned, however, I confine myself to 70 private cases on which I have notes as to the effects of the drugs.

To begin with, I may say at once that I have never seen any harm to the mother result from the treatment, but, on the other hand, a great deal of benefit. Nor have I ever seen a child lost through the employment of the drugs.

The method to which experience has gradually led me is as follows. In a primipara, a first injection of $\frac{1}{8}$ th of a grain of morphine and $\frac{1}{160}$ th of a grain of scopolamine (hyoscine hydrobromide) is given as soon as the pains are coming regularly and strongly at intervals of about seven to ten minutes, and the external os has definitely begun to open. In multiparæ, the same initial dose is given as soon

as the pains are coming regularly and strongly, provided the labour may be expected to last at least four hours. It is essential that all such disturbances as the giving of an emetic should be got over first. This first dose begins to produce its effect within fifteen to twenty minutes, but I do not think the patient can be regarded as in any sense in a "troughing sleep" until after the second dose of scopolamine has been given. The initial dose of morphia counteracts the action of the scopolamine and gives it a chance, which in real time it would not have in the presence of pain to feel the sensation. This dulness may easily be maintained subsequently with minimum doses of scopolamine, provided the second dose is given before the effect of the morphia has begun to diminish. This, I think, is an important point, and I have found that it is almost always best to give the second dose of scopolamine about 45 to 60 minutes after the first dose. Usually the second dose is $\frac{1}{100}$ th of a grain of scopolamine, but if the patient is deeply affected by the first dose I give less, perhaps $\frac{1}{200}$ th. Thereafter, in the great majority of cases, the sleep can be maintained with doses of $\frac{1}{100}$ th of a grain of scopolamine at intervals of about an hour to an hour and a quarter. I do not think the best results can be obtained or expected by following any rigid routine in regard either to dosage or to the intervals between injections. The effect varies to some extent in different patients, and each one ought, if possible, to be judged separately, these points being decided by her condition as estimated either by a memory test, or by the extent to which she appears conscious of such manipulations as examinations. Experience soon enables one to form a good idea of how deeply she is drugged without employing any particular or specific tests.

During the whole time the maintenance of absolute quiet in the room is an important point, and one to which nurses in particular require to be educated. Darkening of the room by drawing the blinds or curtains is also important, and, unlike Dr. Giuseppe, I have never found any difficulty in doing this, nor can I imagine any in an ordinary middle-class house. The patient should never be left. Either doctor or nurse must be in the room all the

time, and if the former leaves the house, he must look in at frequent intervals, and inform the nurse of his whereabouts. I may have been unfortunate, but I do not think I have had quite such good results when I have left a case to routine injections by the nurse.

I usually administer a little chloroform during the actual passage of the head over the perineum. This prevents the patient making sudden movements.

All the 70 cases referred to were conducted in private houses or nursing homes. Forty-eight of the patients were primiparæ, and the maternal complications included albuminuria, cardiac disease, and minor degrees of contracted pelvis. With the exception of one breech case, they were all vertex presentations, and 17 were occipito-posterior in position. In 28 cases there was complete amnesia, the patient remembering literally nothing of the labour after the first, or, more often, after the second injection. In 39 there was very considerable, but not complete, amnesia, with considerable analgesia. Of this class of results, multiparæ, who have previously gone through a labour without the treatment, are the best judges, and all such, with only one exception, were emphatically of opinion that the treatment had helped them greatly, and had left them feeling much better at the end of the labour.

In two cases, the injections produced so much excitement that they had to be stopped and chloroform administered. In one, the drugs produced absolutely no effect whatsoever.

With regard to the children, in only two private cases have I ever had any anxiety, even momentary. Strangely enough, these were both children of the same mother, a multipara. In the first instance, the labour ended much earlier than had been anticipated. On the second occasion, omnopon had been used instead of morphine. The child was the first of twins, and was followed twenty minutes later by a second, which cried at once. In both these cases, a warm bath was the most effective restorative.

In about half of my cases, forceps were used, a little chloroform being given for any operative interference; but being a firm believer in the wholly beneficial effect of the timely and careful use of forceps, I do not feel prepared to

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All the 70 cases referred to were conducted in private houses or nursing homes. Forty-eight of the patients were primiparæ, and the maternal complications included albuminuria, cardiac disease, and minor degrees of contracted pelvis. With the exception of one breech case, they were all vertex presentations, and 17 were occipito-posterior in position. In 28 cases there was complete amnesia, the patient remembering literally nothing of the labour after the first, or, more often, after the second injection. In 39 there was very considerable, but not complete, amnesia, with considerable analgesia. Of this class of results, multiparæ, who have previously gone through a labour without the treatment, are the best judges, and all such, with only one exception, were emphatically of opinion that the treatment had helped them greatly, and had left them feeling much better at the end of the labour.

In two cases, the injections produced so much excitement that they had to be stopped and chloroform administered. In one, the drugs produced absolutely no effect whatsoever.

With regard to the children, in only two private cases have I ever had any anxiety, even momentary. Strangely enough, these were both children of the same mother, a multipara. In the first instance, the labour ended much earlier than had been anticipated. On the second occasion, omnopon had been used instead of morphine. The child was the first of twins, and was followed twenty minutes later by a second, which cried at once. In both these cases, a warm bath was the most effective restorative.

In about half of my cases, forceps were used, a little chloroform being given for any operative interference; but being a firm believer in the wholly beneficial effect of the timely and careful use of forceps, I do not feel prepared to

say that the use of the drugs increased the need for their employment to any great extent. Nor do I think that the injections greatly increase the duration of labour, certainly not seriously. I do, however, think that there is a slightly greater tendency to uterine relaxation during and immediately after the third stage, and, although I have never had a serious hæmorrhage, I make it a practice to inject ernutin or pituitrin in all these cases as soon as the placenta is born.

When the patient wakes up, an hour or two after the delivery is completed, one of the most striking benefits of the treatment becomes apparent, namely, the quite extraordinary sense of well-being. Owing to the painful stimuli having failed to make any lasting impression on the brain, there is an entire absence of shock or prostration, and, to experienced multiparæ, this has been a perfect revelation. Just at first there may be a certain amount of incoherence in thought and speech, but that rapidly passes off.

One or two more practical points. First, I have a thorough distrust of solutions of scopolamine, and always use it in compressed hypodermic tablets. Secondly, although I have given as many as 11 injections to one patient, more than once, I have hardly ever repeated the morphine. It is beyond doubt that it is the morphine that produces the oligopnœa in the child, and, accordingly, it should never be given if there is reason to expect the birth within two-and-a-half hours. I think Dr. Fairbairn's six-hour rule on this point errs on the safe side, and would exclude many suitable cases. Dr. Hedley's rule of never beginning the treatment in the second stage is a little sweeping, although I agree with him that the best results are never got when this is done.

With all deference to Dr. Giuseppi, I must confess that I am not in the habit of worrying over the foetal heart. I believe that it is the morphine that affects the foetus much more than the hyoscine, and, as I never repeat it—or hardly ever—I think that in most cases repeated auscultation of the foetal heart is unnecessary. I know of no real evidence that the hyoscine *in the minimum doses recommended* affects the foetal heart to any dangerous extent. In any prolonged labour one auscultates ut. no.

one is employing scopolamine.

By those about to try the treatment for the first time there are two points worthy of remembrance. The first is that the aim of the treatment is not anæsthesia, nor even analgesia in the first place, but amnesia. If the injections result in the patient appearing to suffer no pain during the uterine contractions, then she is definitely over-dosed. The patient ought to groan and move herself a little during each pain, and in the intervals fall into a sleep. During the pains she may answer questions, or complain of the suffering in perfectly coherent language, and ask for water, which should be given her. But in spite of this apparent consciousness of the sufferings, she will be found to have afterwards little or no recollection of it.

Secondly, the babies after scopolamine-morphine treatment are usually a little sleepy, and rarely cry much for the first twenty-four hours. But, provided the child is breathing regularly, even though slowly, there is no danger. If its colour is bad, then the usual artificial respiration is required, and I have found a warm bath most helpful.

In all probability a slightly cyanosed baby would come right in due course without any treatment at all. But while I have never had the courage to act upon this opinion, I do think that there is some unnecessary nervousness about the minor degrees of cyanosis and oligopnœa occasionally experienced with this treatment.

On account of the time and personal attention needed, I doubt if the treatment can ever be expected to be adopted widely in general family practice. Anything like indiscriminate use of it would certainly be dangerous.

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On account of the time and personal attention needed, I doubt if the treatment can ever be expected to be adopted widely in general family practice. Anything like indiscriminate use of it would certainly be dangerous.

SOME RECENT VACCINE THERAPY.

BY ALEXANDER FLEMING, F.R.C.S.

*Assistant Bacteriologist under the National Medical Research Committee;
Pathologist, London Lock Hospitals.*MIXED VACCINES IN IMMUNIZATION AGAINST TYPHOID
AND PARATYPHOID FEVERS.

IN my article on typhoid inoculation in THE PRACTITIONER just over a year ago,¹ I shortly discussed the question of the use of mixed vaccines for the prevention of the "Enteric Group" of diseases.

The opinion expressed at that time was, that as typhoid was by far the most serious disease of this group, and as it had been proved conclusively that a vaccine of the typhoid bacillus gives good immunity to this disease, it would be very unwise to use a mixed vaccine if the immunity conferred to typhoid would be in any way interfered with.

The idea of mixed vaccines is by no means a new one, and they have been used very extensively and with success in clinical medicine for the treatment of diseases, in which two or more organisms are the infecting agents. They have for years, too, been used as a prophylactic measure for diseases such as the common cold, in which the infecting agent may be one of several microbes. In these cases, the vaccine is made of a mixture of all the microbes which may produce the disease, and such a vaccine has been highly successful in practice.

In connection with the "Enteric Group" of diseases, Castellani has, for a number of years, advocated a mixed vaccine of typhoid and paratyphoid A and B, and he has shown that such a vaccine, when injected, gives rise to the production of immune bodies (agglutinins) to all the organisms injected.

This question of mixed vaccines was the subject of a discussion at a meeting of the Society of Tropical Medicine and Hygiene in November, 1915, when Dr. Castellani strongly

advocated the routine use of mixed vaccines for the immunization of troops in the field, and he put forward figures to show that the agglutinins developed in the serum, as a result of the inoculation of such mixed vaccines, were not less than when the vaccines were given separately. Not only did he advise the use of mixtures of typhoid and paratyphoid, but he also suggested the addition of one or all the microbes causing cholera, plague, or Malta fever.

The following table, which is extracted from one given by Castellani dealing with the injection of ordinary vac-

—	Nature of Vaccine.	Typhoid.					Paratyphoid A.					Paratyphoid B.				
		Weeks after Inoculation.					Weeks after Inoculation.					Weeks after Inoculation.				
		1.	2.	4.	8.	15.	1.	2.	4.	8.	15.	1.	2.	4.	8.	15.
David -	Mixed -	0	400	200	80	20	0	60	60	60	20	0	20	20	20	20
Fernendo	Mixed -	0	300	200	80	20	0	60	60	60	20	0	20	20	20	20
Peter -	Typhoid -	20	500	200	150	0	0	0	0	0	0	0	0	0	0	0
Singho -	Paratyphoid A.	0	0	0	0	0	20	80	40	60	0	0	0	0	0	0
Asson -	Paratyphoid B.	0	0	0	0	0	0	0	0	0	0	0	50	60	20	0

The numbers represent the dilutions of serum which agglutinated the organism.

cines killed by heat, shows that the response, as measured by agglutinins, is usually more rapid when the single vaccine is given, although, after two weeks have elapsed, the results are much the same with both vaccines.

This point of the delayed response to the mixed vaccine was further brought out by Dr. Freeman in the same discussion. This observer, working with a pure cholera vaccine and a mixed vaccine of cholera and typhoid, showed that, as regards the agglutinins, the opsonins and the bactericidal substances, the development of immunity was slower when the mixed vaccine was used than when cholera vaccine alone was employed.

It would appear, therefore, that where an immediate effect is wanted, as, for instance, the immunization of the community after the outbreak of an epidemic, it would be wise to use a single vaccine; whereas, when it is the lasting effect which is aimed at, the resultant immunity is as good when a mixed vaccine is given.

It is of the greatest importance, in connection with the

use of any vaccines on a large scale, that the reaction following their use should not be very severe.

The question of the reaction following mixed typhoid and paratyphoid vaccines has been fully discussed in a very valuable paper by Coppinger and Gibson in the *Journal of the Royal Army Medical Corps* (May, 1916).

They found that, with the mixed vaccines, the reaction began earlier than with typhoid vaccine alone, and the local reaction was definitely greater. When the mixed was given, even when the typhoid portion of the vaccine was made with broth cultures, only a small proportion of the individuals injected had temperatures over 101, and none exceeded this when the typhoid portion of the vaccine was made from agar cultures. These observers also demonstrated a very good immunizing response in the inoculated men following the mixed vaccine. In practice, therefore, it has been found that the reaction following the use of mixed vaccine of typhoid and paratyphoid (T.A.B. vaccine) is not greatly in excess of that following pure typhoid vaccine, and this slight drawback is more than compensated by the increased immunity to paratyphoid. For the past year, therefore, inoculations have been of the mixed T.A.B. vaccine, the composition of which is 1,000 millions typhoid bacilli and 500 millions each of paratyphoid A and B. Two inoculations should be given: the first, of half a cubic centimetre, and the second, ten days later, of one cubic centimetre.

VACCINATION AGAINST PNEUMONIA.

Since vaccine therapy became an established practice in medicine, many isolated attempts had been made to treat lobar pneumonia with vaccines of pneumococcus, and results have been published showing various degrees of benefit, which have followed the use of vaccines. On the whole, however, the results have been disappointing, but until 1911, no systematic attempt had been made to employ pneumococcus vaccine as a prophylactic against pneumonia. In that year, Sir Almroth Wright and his co-workers, Drs. Parry Morgan, Dodgson and Colebrook, studied this question on a large scale among the Kaffirs employed on the Rand mines, where pneumonia is very prevalent. Their results were published in 1913, and were noted in my review of

work on vaccine therapy in *THE PRACTITIONER* of that year. Briefly, they found that, by employing large doses of pneumococcal vaccine, the incidence of the disease was reduced very decidedly (in some cases 50 per cent.), and the case mortality was also diminished. Since this report was published, a number of interesting and important facts regarding the pneumococcus have come to light. It has been clearly established that pneumococci can, by means of serum reactions, be divided into several definite groups. The members of these different groups are identical morphologically; yet the injection of a vaccine of one group confers immunity to that group only and not to others.

Thus, the pneumococci have been split up in exactly the same way that, in the last year or two, the meningococci have been divided into groups, morphologically the same, but, as regards immunity, quite different.

Dochez and Gillespie in New York showed that virulent pneumococci from lobar pneumonia could be divided into four groups, viz. :—

Type 1, representing 45 per cent. of all cases.

"	2,	"	20	"	"	
"	3,	"	14	"	"	(pneumococcus mucosus).
"	4,	"	22	"	"	

Group 4 "consists of a heterogenous collection of isolated individuals which cannot be related to one another by immunologic reactions."

Lister, in South Africa, finds the same groups 1, 2 and 3, but, in addition, finds another group which he calls "A," which is very prevalent on the Rand. He also finds four other groups of less importance. He has recently published a paper giving the results of his experiments in South Africa, where he has continued the work initiated by Sir Almroth Wright and alluded to above.

By means of what is, to all intents and purposes, Wright's opsonic method, he was able to demonstrate immune bodies (opsonins and agglutinins) in the blood of rabbits and men inoculated with pneumococcal vaccines. These immune bodies were only produced towards the particular group of pneumococci, which had been used for injection. For

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Such immunity, however, seems to be conferred] by inoculation with a mixed vaccine of the several types.

It would seem, from the results obtained in South Africa by the workers referred to above, that there may yet be a very great field for the prophylactic use of pneumococcus vaccine even in countries such as this, where the disease does not take an epidemic form. In all probability there are, in England, a number of different types prevalent just as in New York and South Africa, and a prophylactic vaccine will have to include representatives of these different types.

Possibly, too, we may find that, using larger doses of vaccine than we have been accustomed to do, we shall be able to employ the vaccine with greater success in the treatment of the disease.

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Using a mixed vaccine, immune bodies were developed to all the groups. Injections were made intravenously and subcutaneously, and it was found that, by the intravenous method, the optimum result could be obtained with a much smaller dose of vaccine, although, in both man and in rabbits, the same result could be obtained by the subcutaneous method if the dose were sufficiently increased.

On a large scale there are practical difficulties in the way of intravenous inoculation, so Dr. Lister advocates, for prophylaxis, three subcutaneous inoculations at weekly intervals, of 6,000 millions of each of the groups of pneumococci against which it is desired to immunize the individual.

Suppose there are five prevalent groups, this makes the formidable total of 30,000 million pneumococci at each injection. It might be thought that this quantity of vaccine would cause a violent reaction, but apparently this is not so, and he states definitely that the reaction is certainly less than with ordinary prophylactic typhoid vaccine.

Dr. Lister confirmed his serological results by injecting 12 rabbits, six of which had been previously protected by inoculation with pneumococcus vaccine, with eight times the lethal dose of living pneumococci. All the uninoculated rabbits died, and all the inoculated rabbits survived, clearly demonstrating the value of the vaccine.

According to his results, all the previous prophylactic inoculations of pneumococcal vaccine on the Rand had been too small to give the maximum amount of immunity, but yet a very considerable reduction in the incidence of the disease had been effected, as shown by Sir Almroth Wright, and later by Dr. Maynard.

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conducting channel of the heart, and the path along which the exciting stimulus travels from auricles to ventricles, and by which it is distributed throughout the cardiac musculature.

SA represents the sino-auricular node, the most irritable part of a normal heart and the starting-point of the heart's beat, while AV represents the auriculo-ventricular node—a structure resembling it in many respects. Joining SA and AV is a more or less definite band,¹ the bundle of Flack (F). While starting from the AV node and running down the interventricular septum, is the main bundle of His, or Stanley Kent. This divides into a Right (r¹) and Left (l²) branch, the former passing to the right ventricle, where it ends chiefly in the right papillary muscle, and the latter to the left ventricle, where it terminates chiefly by arborizing round about the apex, chiefly on the inner surface.

Side by side with this is a normal electrocardiogram. This is a graphic record of the electrical beat of the heart, but I think it may be regarded as something more than this, and be taken to be "an actual and accurate graphic record of the functional state of the heart muscle." The significance of the different parts of the curves are possibly well known to most, but, even if I have subsequently to modify my view, I wish to associate the *different waves with activity in definite regions of the heart muscle*. With this end in view, I have had placed on my first diagram the letters of the electrocardiographic curve, which corresponds to activity of the different parts indicated. Briefly enumerating the different waves, they are as follows:—

P = Auricular complex, and corresponds to auricular contraction.

QRST = Ventricular complexes.

QRS = 1st ventricular complex.

T = 2nd ventricular complex.

Q = corresponding, in all probability, to contraction to the upper part of the septum (Lewis).

¹ The writer is not convinced that this exists in the human heart and suggests that the stimulus radiates out from SA as indicated by the broken lines.

BUNDLE LESIONS.*

By J. STRICKLAND GOODALL, M.B., M.R.C.P., F.R.C.S., F.R.S.E.

Lecturer on Physiology and Sub-Dean, Middlesex Hospital; Assistant Physician, National Hospital for Diseases of the Heart, London; Consulting Cardiologist, Red Cross and Australian Auxiliary Hospitals.

CHARACTERISTIC cases of definite heart-block are, on the one hand, sufficiently uncommon to be interesting, and, on the other hand, sufficiently common to be important. It is partly for this reason, and partly because few, if any, cardiac lesions demonstrate better the essential value of the electro-cardiograph as an aid to diagnosis, that I have chosen the subject of Bundle Lesions for demonstration.

First, I would draw attention for a moment to diagram 1, constructed by Mr. Dale Richards and myself, to indicate

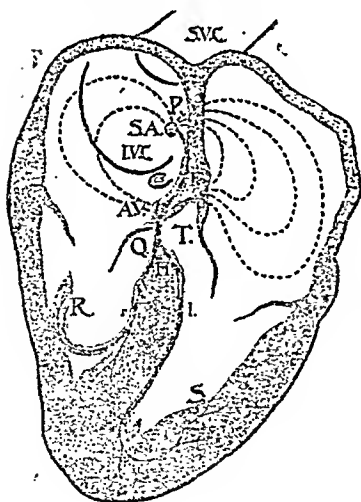


FIG. 1.

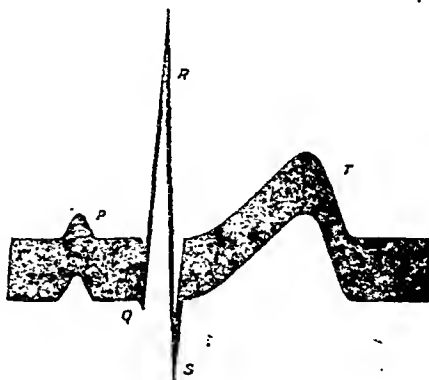


FIG. 2.

the main connections of the bundle system—the great

* Based on a demonstration to the members of the Hunterian Society at the National Hospital for Diseases of the Heart, London.

conducting channel of the heart, and the path along which the exciting stimulus travels from auricles to ventricles, and by which it is distributed throughout the cardiac musculature.

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R, to the contraction of the right ventricle, chiefly the right papillary muscle.

S, to the contraction of the left ventricle in the region of apex ; while T corresponds, in all probability, to the contraction of the muscle in the region of the (aortic) base.

The PR interval is the expression of the conductivity of the bundle of His, and hence its measure is a direct and reliable guide to the functional state of this vitally important path.

Lesions of this bundle system may involve either the whole tract and not be referable to any special part, or be confined to some definitely localizable position. In the former class of cases, there is a general depression or impairment in the conductivity of the bundle, as is shown by increase in the PR interval. This is well shown in Case 1. A woman, M. W., aged 24, suffering from double mitral disease with occasional extra systoles, she gave a definite history of rheumatic fever at the ages of 13 and 17. The PR interval in this case being just under .3 second, as compared with .16 in a normal average case.

The electrocardiogram (Fig. 3), with its measurements



FIG. 3.

LEADS.	P.			Q.	R.			S.			T.		
	Form.	Duration.	Height.		Form.	Duration.	Height.	Form.	Duration.	Height.	Form.	Duration.	Height.
Case i. II.	Flat Bifid.	Sec. '13	Mm. 6	Abs.	Normal.	Sec. '06	Mm. 15	Normal.	Sec. '03	Mm. 8	Normal.	Sec. '3	Mm. 5
Normal II.	Normal.	'06	5	Abs.	Normal.	'03	14	Normal.	'03	6	Normal.	'2	'8

NOTES :—PR Case I. = '3 sec. PR normal = '16 sec.

FIG. 3 (b).

(Fig. 3 (b)) is given (*see* bottom of preceding page), together with a normal (Fig. 4) for comparison.

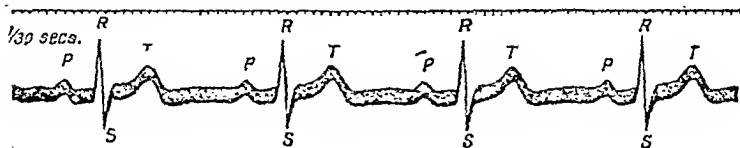


FIG. 4.

Such generally depressed conductivity may be either temporary, as in such acute conditions as pneumonia, diphtheria, or septic states generally, or permanent and usually progressive, as in rheumatic fever or in certain forms of syphilis.

Turning now to those conditions in which there is a definitely localized damage to the bundle system, such damage may be intra-auricular, and affect the region of the sino-auricular node, when the whole heart is slowed, either continuously or periodically, long "silent" periods occurring.

Under this heading one includes cases of bradycardia, well seen in the typical well-trained athlete's heart, of which Record 2 is an excellent example. This case, sent me by my friend, Dr. Allport, was obtained from a well-known

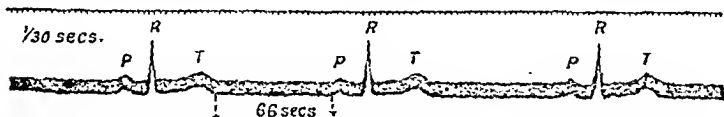


FIG. 5. Record 2.

athlete just prior to a rowing match. This heart varied between 32 and 40 per minute normally,¹ and gave a typical "athlete's" reaction to exercise, and sino-auricular heart block—a condition in which occasional silent periods occur, interspersed with beats of normal frequency.

Record 3 (Fig. 6) is illustrative of such a condition; it is the heart of a professional man, who led a strenuous

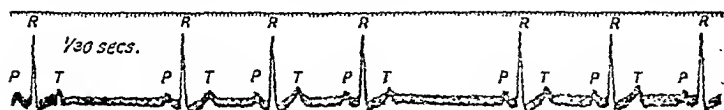


FIG. 6.

¹ This heart has been under observation many years.

R, to the contraction of the right ventricle, chiefly the right papillary muscle.

S, to the contraction of the left ventricle in the region of apex ; while T corresponds, in all probability, to the contraction of the muscle in the region of the (aortic) base.

The PR interval is the expression of the conductivity of the bundle of His, and hence its measure is a direct and reliable guide to the functional state of this vitally important path.

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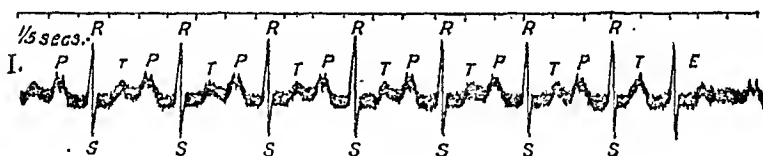


FIG. 3.

LEADS.	P.			Q.	R.			S.			T.		
	Form.	Duration.	Height.		Form.	Duration.	Height.	Form.	Duration.	Height.	Form.	Duration.	Height.
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NOTES:—PR Case I. = .3 sec. PR normal = .16 sec.

FIG. 3 (b).

or (3) a Gibson's sound (Fig. 9 (b)). The cardio-phonogram shows this third sound always to be associated with the auricular systole. The electrocardiographic records enable

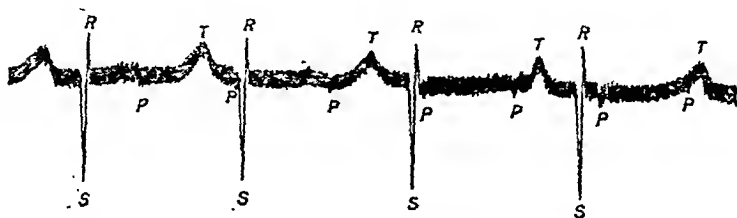


FIG. 9.

us to see the auriculo-ventricular dissociation that has occurred in this case, and to get an insight into the various rhythms which exist from time to time. Coupling of the beats at the apex is common, and is well shown.

Finally, the right or left main bundle branches may be

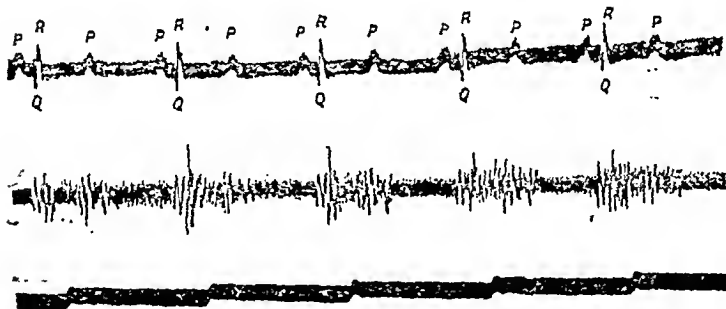


FIG. 9 (b).

injured; the former case is well illustrated by patient 5 (Fig. 10). P., aged 72, who was seen, complained of pain in the left side, and an irregular heart due to a disease of cardiac disease. wide R¹ in

A A

and not over discreet life. This condition is often temporary and frequently vagal in origin, but at times is associated with definite indications of structural change in the heart muscle. Again, the main trunk of the bundle may be damaged, when either incomplete or complete heart block results—the latter condition being known as Stokes Adams's disease.

Case 4 (Figs. 7, 8, 9), M. G., illustrates the auriculo-ventricular dissociation which results from such a lesion. She is a woman aged 27, scarlet fever when $3\frac{1}{2}$ years old.

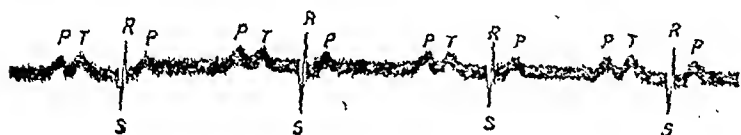


FIG. 7.

Her general condition is dull and apathetic. On examination, the condition is found to be most variable, no two observations [ever] [revealing exactly] the same condition.

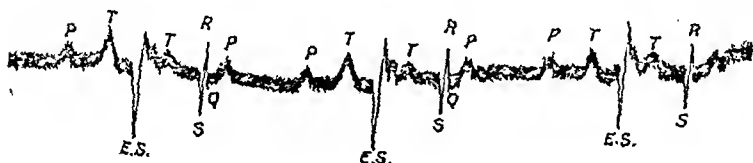


FIG. 8.

Usually the pulse is slow—32. Apex beat down and out about 64. Jugulars pulsating and often beating twice to the carotid's once. A systolic thrill is at times felt at apex and at base. Cardiac dullness is increased. On auscultation at the apex, one often hears three sounds—a systolic murmur, a second sound, and a third sound, which may be either (1) a diastolic murmur: (2) a re-duplicated 2nd sound,

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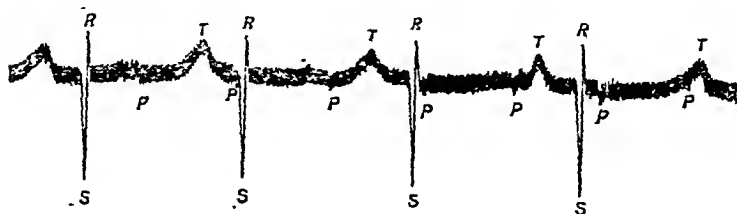


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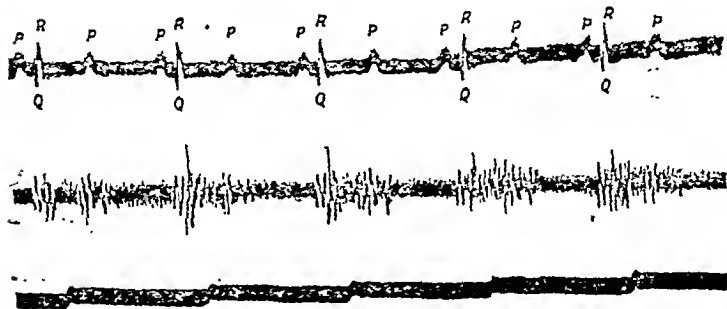


FIG. 9 (b).

injured; the former case is well illustrated by patient 5 (Fig. 10). S. P., aged 72, when first seen, complained of pain in her left side, and beyond having an irregular heart due to extra systoles, presented no definite signs of cardiac disease. The characteristic electrocardiogram, wide R¹ in

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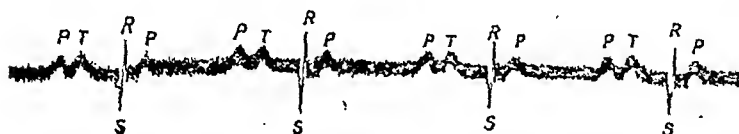


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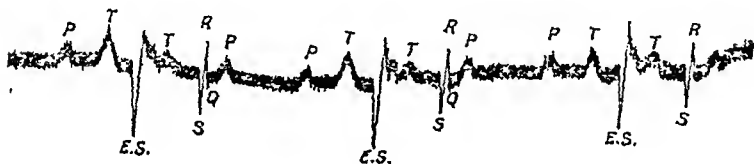


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SOME OBSERVATIONS ON THE VENOUS PULSE.

BY H. L. FLINT, M.B., CH.B., CAPTAIN R.A.M.C.

Assistant Surgeon to the Mansfield Hospital.

IN this article, I attempt to deal with those features of the venous pulse, which have caused me most difficulty in their interpretation. They are difficulties which all beginners in the use of the polygraph will experience and must be able to solve, before a correct reading of the venous pulse can be obtained. It is hardly necessary to point out that, unless a jugular tracing is correctly interpreted, it becomes a false guide instead of a great help in the diagnosis, prognosis, and treatment of the patient.

It is not within the scope of this article to give an explanation of the factors entering into the causation of the venous pulse. The reader will find the whole subject admirably dealt with in Mackenzie's book, *Diseases of the Heart*. It is to those who have already fallen under the spell and fascination of the study of cardiac disorders by the aid of the clinical polygraph, that I hope this article will prove both interesting and instructive.

As it is erroneously but commonly considered by many that the clinical polygraph is a means of diagnosing "all" forms of heart disease, and is able to determine whether a murmur is functional or organic, it is most important to have a clear idea of the class of cases in which a venous tracing is really of the greatest importance as an aid to a correct diagnosis, intelligent prognosis, and treatment.

After first enumerating the features of the cardiac action, which are demonstrated in a tracing from a normal heart, I will mention the forms of cardiac disorders in which a venous tracing is absolutely necessary before the condition can be fully and intelligently appreciated.

The following are the features shown by a polygraph tracing in normal hearts :—

1. The rate at which the heart is beating.
2. The fact that it is beating regularly, both in rhythm

Nature.	Varieties.	Electrocardiogram.
Generally depressed conductivity (no local lesions)	{ (a) <i>Acute temporary</i> e.g., pneumonia or acute septic condition (b) <i>Chronic permanent</i> e.g., Rheumatism or syphilis and usually progressive.	Physiological in type but P.R. interval above .16 sec. (Fig. 3, Case I.)
Bundle Lesions.	(a) Auricular	{ i. <i>Bradycardia</i> { i. <i>Physiological</i> e.g., athlete's heart ii. <i>Pathological</i> e.g., after debilitating diseases
		Physiological in type — long rest period. (Fig. 5, Case II.)
	ii. Sino-auricular heart block	Silent periods interspersed with normal beats — P. waves often inverted. (Fig. 6, Case III.)
Impaired conductivity referable to a local lesion	(b) Auriculo-ventricular	{ i. <i>Incomplete</i> { <i>Temporary</i> e.g. pneumonia ii. <i>Complete</i> { <i>Permanent</i> e.g. rheumatism — Stokes Adams's disease
		P. waves in abnormal and variable positions. (Figs. 7, 8, 9, Case IV.)
(c) Ventricular	i. Right branch lesion	{ General resemblance to left sided preponderance with a tall wide R ¹ lead I. and a deep wide S ¹ , lead III. (Fig. 10, Case V.)
	ii. Left branch lesion	{ General resemblance to right sided preponderance — deep wide S ¹ lead I., tall wide R ¹ lead III. (Fig. 11, Case VI.)

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The following are the features shown by a polygraph tracing in normal hearts:—

1. The rate at which the heart is beating.
2. The fact that it is beating regularly, both in rhythm

and force.

3. That the auricle and ventricle are beating in a regular sequence.
4. The amount of time taken by the impulse to travel from auricle to ventricle along the auriculo-ventricular bundle.
5. What proportion of time in every heart beat is taken up by the contraction of the auricles and ventricles, and what by their diastole.

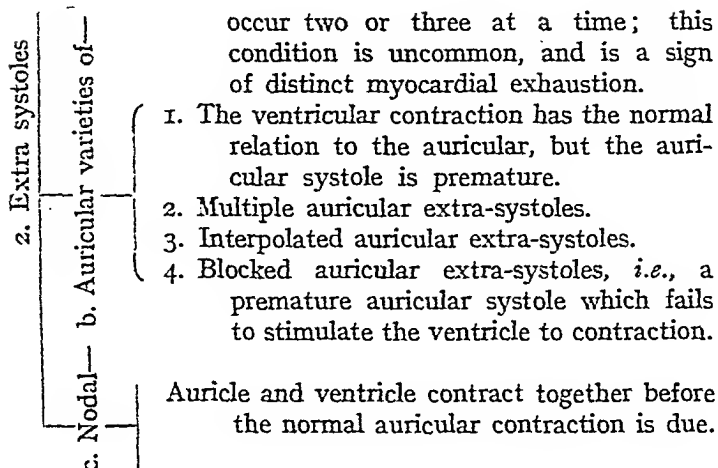
CONDITIONS IN WHICH POLYGRAPH TRACINGS ARE ABSOLUTELY NECESSARY.

The clinical polygraph is most helpful, and its use is almost entirely confined to the differentiation of cardiac irregularities, abnormal rhythms, such as auricular flutter and fibrillation, and conditions like heart block.

When confronted with the problem of a venous tracing, it is necessary to be familiar with all the possible conditions it may present. If the tracing is not immediately capable of solution, all the various conditions that may be represented must be gone through systematically, in order to see which condition is present. I therefore give, in skeleton form, a classification of all the various forms of cardiac irregularity, which is always before my mind when attempting to solve a difficult tracing, and I make a habit of working through this list systematically, eliminating each condition in turn.

1. Sinus or youthful type of irregularity.

- | | | | |
|-------------------|------------------------------|---|--|
| 2. Extra systoles | a. Ventricular varieties of— | { | <ol style="list-style-type: none"> 1. The ventricular contraction occurs before the auricular. 2. The ventricular contraction occurs at the same time as the auricular, and gives rise to one large wave. 3. The ventricular contraction follows the auricular at too short a distance for the contraction to be the result of an auricular stimulus. 4. Interpolated, <i>i.e.</i>, a ventricular systole occurs between two normal ventricular contractions. 5. Multiple ventricular extra-systoles. These |
|-------------------|------------------------------|---|--|



3. Auricular fibrillation.

4. Auricular flutter.

5. Depression of the function of conductivity of the auriculo-ventricular bundle—*i.e.*, heart block—partial or complete.

6. Exhaustion of the function of contractility or pulsus alternans.

7. Sino-auricular block *i.e.*, the stimulus at the sino-auricular node fails to give rise to a contraction, so that a complete cardiac cycle is missed.

8. Escaped ventricular beats; in cases of partial heart block, the ventricle occasionally contracts on its own account, before the delayed stimulus from the auricle reaches it.

STANDARD POINTS OF MEASUREMENT IN A JUGULAR TRACING.

(SEE FIG. 1.)

It is a good plan, when solving tracings, to make a practice of systematically using the following points of measurement :—

Point 1 marks the beginning of auricular contraction.

Point 2 marks the hardening of the ventricles as they begin to contract. This point is seen in an apex tracing.

Point 3 marks the opening of the semilunar valves and

the commencement of the carotid pulse.

Point 4 marks the beginning of the radial pulse.

Point 5 marks the closure of the semilunar valves.

Point 6 marks the opening of the tricuspid valve. This is usually a well-defined point, occurring at the summit of the ventricular or "V" wave.

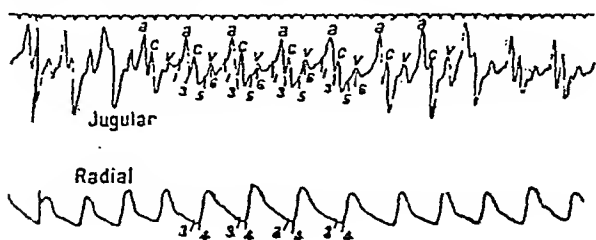


FIG. 1.

In all the tracings reproduced in this article, each division of the time marker is 1-5 sec.

The space between points 2 and 3 is called D, or the presphygmic period of the ventricular systole.

The space between points 3 and 5 is called E; this is the period of ventricular output, called the sphygmic or pulse period.

The space between points 5 and 6 is called F; the prosphygmic period.

The space between points 6 and 2 is called G; this is the period of ventricular diastole.

THE ROUTINE METHOD OF APPROACHING A TRACING.

1. Examine the radial tracing to see if it is regular in both its rhythm and the force of its contraction.

2. Mark in point 4, at the beginning of the upstroke in the radial tracing.

3. Mark in point 3, 1-10 sec. before 4. Point 3, the beginning of the carotid pulse, usually occurs 1-10 sec. before the radial. This measurement can always be checked by taking a tracing of two or three of the carotid beats.

4. With a pair of compasses measure the distance from the ordinate at the beginning of the radial tracing to point 3. With the compasses fixed, mark in point 3 on the jugular

tracing, measuring from the ordinate at the beginning of the tracing. Point 3, in a normal tracing, will fall at the beginning of the carotid wave.

5. From point 3 in the jugular tracing mark in point 1, 1-5 sec. before point 3. This will normally fall at the beginning of the auricular wave. The auricle normally begins to contract 1-5 sec. before the beginning of the carotid pulse. The space between 1 and 3 is known as the A-C interval, and is taken as the measure of time that it takes the stimulus to pass from the auricle to the ventricle. I shall return to this measurement before long.

6. Now mark in point 6 on the jugular tracing. This is usually a well-defined point. It is the point at which the "V" wave just begins to fall. On the radial tracing, point 6 usually falls near the bottom of the aortic notch; it should always be checked by this measurement.

7. Point 5 is not of much practical importance in solving tracings. When present, it is represented by a notch on the "V" wave about 1-10 sec. before point 6.

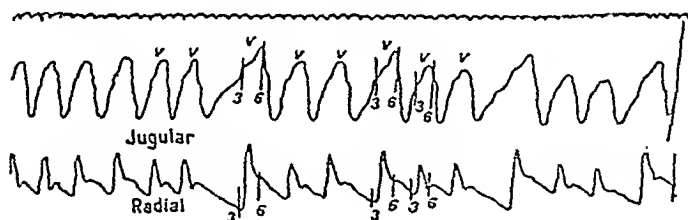


FIG. 2.

If tracings are systematically attacked in this way, the great majority will be capable of solution.

I need only remind my readers that there are two varieties of venous pulse: (a) the auricular; (b) the ventricular.

(a) The auricular venous pulse normally shows an "A" wave due to the contraction of the auricle, followed by C and V waves, but the last two waves may be absent in cases like auricular flutter. Fig. 1 is an example of the auricular type of venous pulse.

(b) The ventricular venous pulse does not show an

the commencement of the carotid pulse.

Point 4 marks the beginning of the radial pulse.

Point 5 marks the closure of the semilunar valves.

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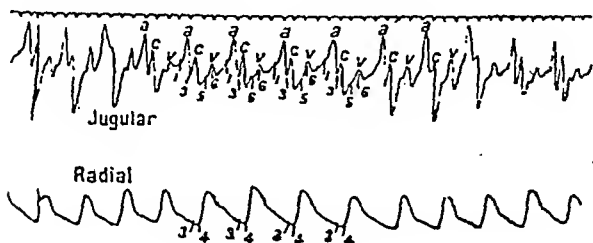


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- A-C interval is adopted, which I shall soon describe.
3. In cases in which the A-C interval is increased considerably, an "H" wave may occur as a post-auricular wave between the "A" and "C" waves. This wave is usually only small, for there is a dilating auricle interposed between the tricuspid valve and the jugular vein.
 4. In cases of partial heart-block, a well defined "H" wave may occur after those auricular contractions which are not followed by ventricular contractions. This wave must not be mistaken for a ventricular wave.
 5. In cases of auricular fibrillation in which the "H" wave is present, it may be mistaken for an auricular wave, and give rise to a false interpretation of the tracing. In these cases, the space between the "V" and "H" waves is constant, whereas the space between the "H" and "C" waves is variable, because the rhythm in cases of fibrillation is always irregular, except in some cases in which the heart is under the influence of digitalis, and when fibrillation occurs with heart-block. But, in these two exceptions, the rhythm is slow, and the "H" wave would be so far separated from the "C" wave that it could not be mistaken for an "A" wave.
 6. The "H" wave may produce a third sound heard only at the apex.

Fig. 4 is an interesting tracing. It shows a ventricular extra systole after every second normal contraction. In the jugular tracing, there is a well-marked "H" wave which only occurs after the extra systoles. The explanation of this is either—

- (a) During the extra systole the auricle and ventricle contract together, so that no blood can pass during the auricular systole from the auricle into the ventricle. This gives rise to congestion of the auricle and great veins, so that, when the tricuspid valve opens, the rush of blood from the auricle into the ventricle is greater than after a normal contraction, and is now sufficient to close

auricular wave, but one large wave, due to the contraction of the ventricle (see Fig. 2).

Another type of the ventricular venous pulse shows a mid-systolic fall, due to the contraction of the ventricle, pulling down and expanding the auricle (see Fig. 8).

THE HIRSCHFELDER OR A. G. GIBSON WAVE.

Another wave, with which the reader must be familiar, is the Hirschfelder or A. G. Gibson wave. It is caused by the sudden inrush of blood from the auricle into the ventricle, momentarily closing the auriculo-ventricular valves. This wave, when present, usually occurs after the "V" wave (see Fig. 3, waves marked "H").

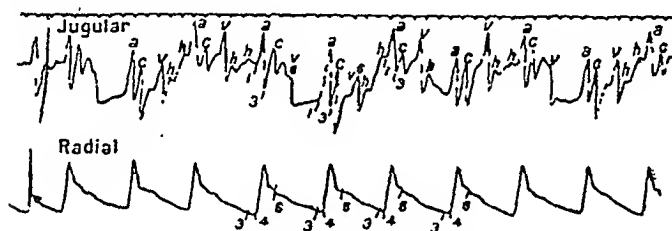


FIG. 3.

A Hirschfelder wave may cause considerable confusion in the attempt to solve a tracing, unless the following conditions, under which it may occur, are born in mind.

1. In a slowly beating heart, the "H" wave may fall midway between two auricular waves, and give rise to the false supposition that the case is one of partial heart-block, in which the ventricle fails every other beat to contract in response to the auricular stimulus.
2. When the heart increases in rapidity, the shortening of the cardiac cycle takes place at the expense of the diastolic period, so that an "A" wave may fall on the top of an "H" wave. It is then impossible to say exactly where the "A" wave begins, and it may give rise to the belief that the A-C interval is increased, unless the method of measuring this

- A-C interval is adopted, which I shall soon describe.
3. In cases in which the A-C interval is increased considerably, an "H" wave may occur as a post-auricular wave between the "A" and "C" waves. This wave is usually only small, for there is a dilating auricle interposed between the tricuspid valve and the jugular vein.
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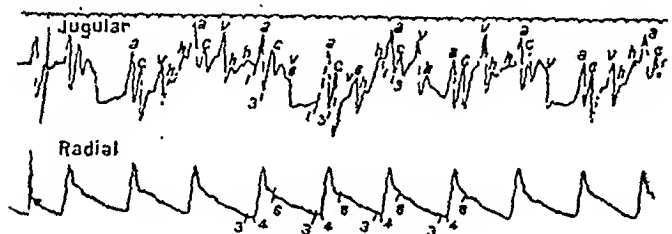


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2. When the heart increases in rapidity, the shortening of the cardiac cycle takes place at the expense of the diastolic period, so that an "A" wave may fall on the top of an "H" wave. It is then impossible to say exactly where the "A" wave begins, and it may give rise to the belief that the A-C interval is increased, unless the method of measuring this

wave, and transfer this measurement on to the radial tracing; then the distance from this point to point 4 is the measurement of the A-C interval. Look at Fig. 3. If the heart rate was increased, the "A" wave would fall on the top of one of the "H" waves. If, then, the distance between 1 and 3 was taken as the measurement of the A-C interval, this would appear to be considerably increased.

HOW TO DIFFERENTIATE BETWEEN VENOUS AND ARTERIAL TRACINGS FROM THE NECK.

I think that my greatest difficulty in interpreting jugular tracings has been to know with certainty, whether the tracing from the neck was venous or arterial. It is very necessary to be able to decide this question correctly. The following cases illustrate this difficulty:—

CASE 1.—The history of this case, though interesting, is of no importance to my present purpose, so I will only give it briefly.

H., aged 25, a soldier, admitted to hospital on account of attacks of dizziness whilst on parade and a great deal of headache. Never had any fits or loss of consciousness. Subject to attacks of dizziness and headaches all his life. No history of rheumatic fever. Temperature on admission, 100°, which persisted for some days, but immediately gave way to sodium salicylate. He had not had any digitalis previous to admission.

I took a number of tracings of this case, but, for some time, I thought I had failed in each attempt to get a venous tracing. I thought that the tracings which I got from the neck were arterial. It will be seen that I was mistaken. I attribute my mistake to two causes:—

- (a) Before taking the tracing, I had made up my mind, from an examination of the heart, especially from the short, sharp sounds I heard over the apex, that the case was one of frequent extra systoles giving rise to anæmia of the brain, due to the small ventricular output, and that this was the cause of the dizzy attacks.
- (b) Failure to examine the tracing in a routine systematic manner.

From a first glance at Fig. 5, there is some excuse for

this valve momentarily and so give rise to an "H" wave; or

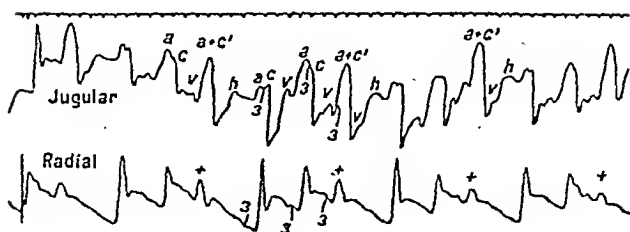


FIG. 4.

- (b) After the extra systole, the diastolic period is lengthened, which gives time for the "H" wave to appear. I believe that, after some of the normal contractions, the beginning of an "H" wave can be detected, but it is concealed by the next auricular wave falling on the top of it.

THE MEASUREMENT OF THE A-C INTERVAL.

As the measurement of the A-C interval is the way we estimate the function of conductivity of the auriculo-ventricular bundle, it is important that it should be accurate. The usual method of estimating the A-C interval is to take the distance between points 1 and 3.

Point 1, the beginning of auricular contraction, is very often ill defined. For example, suppose the auricular wave falls on an "H" wave or on the summit of a "V" wave, it is impossible to say where the auricular wave begins; and, under these conditions, it is often erroneously assumed that the A-C interval is increased as the result of some pathological lesion in the bundle of His.

Professor Wardrop Griffith has described a very much more accurate method of measuring the A-C interval, which has the great advantage of being independent of the knowledge of the point at which the auricle begins to contract. He calls it "the summit of the auricular wave to the beginning of the radial pulse (point 4) measurement." With a pair of compasses, take the measurement from the ordinate at the beginning of the jugular tracing to the summit of the "A"

wave, and transfer this measurement on to the radial tracing; then the distance from this point to point 4 is the measurement of the A-C interval. Look at Fig. 3. If the heart rate was increased, the "A" wave would fall on the top of one of the "H" waves. If, then, the distance between 1 and 3 was taken as the measurement of the A-C interval, this would appear to be considerably increased.

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- (b) Failure to examine the tracing in a routine systematic manner.

From a first glance at Fig. 5, there is some excuse for

assuming the condition to be one of extra systoles, and the tracing from the neck arterial in character. The three waves

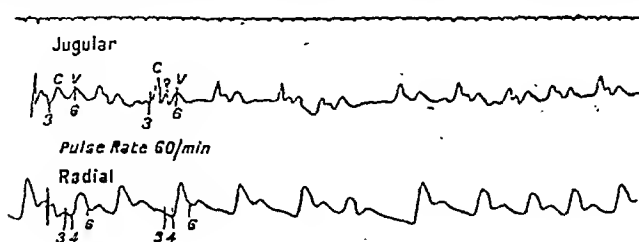


FIG. 5.

I have marked "C," "?," "V," I thought were respectively percussion, tidal, and dicrotic waves in the carotid pulse.

Fig. 6 represents diagrammatically the percussion, tidal, and dicrotic waves which may occur in the arterial pulse. The percussion wave, P, is caused by the lever of the instrument being thrown up with a jerk; it falls down on to the true pressure or tidal wave, T. If it were not for the instrumental error causing the percussion wave, the tidal wave would take the course of the dotted line. The dicrotic wave, "D," is caused by the closure of the semilunar valves. "a" is the aortic notch.



FIG. 6.

The tracing from the neck in Fig. 5 is not arterial and therefore venous, for the following reasons:—

1. There are no separate percussion and tidal waves shown in the radial pulse.
2. There are no separate tidal and percussion waves shown in the carotid pulse (*see* Fig. 7).
3. In the case of the first beat on the jugular tracing, the dicrotic wave would be as large as the percussion wave, but this is not so in the radial tracing.
4. Careful measurement shows that the space from the beginning of wave "C" to the bottom of the fall

of the wave marked "?" is greater than the space from the beginning of the radial pulse to the bottom of the aortic notch. If the tracing from the neck was arterial and not venous, this would mean that the sphygmic period in the carotid pulse was greater than that in the radial. Such a condition is impossible.

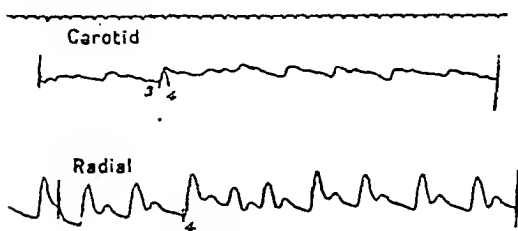


FIG. 7.

5. In Fig. 8, which is a tracing from the same case, the "V" wave is so large, that it obviously is not a diastolic wave.
6. Fibrillation waves are seen in Fig. 8, marked X.

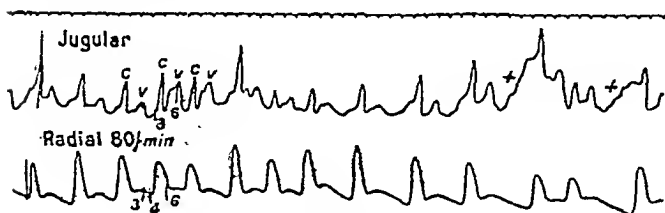


FIG. 8.

For the reasons given above, we are justified in concluding that the tracing is a true venous and not a carotid one.

The next step is to determine whether the venous tracing is of the auricular or ventricular type. Now, there is in the tracing no wave which will correspond to an auricular wave. When a "V" wave occurs as large as that in Fig. 8, the auricle, if it contracted, would certainly produce a well defined wave. (There are two exceptions to this statement.) We are therefore driven to the conclusion, that the jugular tracing is ventricular in type, and that the case is,

assuming the condition to be one of extra systoles, and the tracing from the neck arterial in character. The three waves

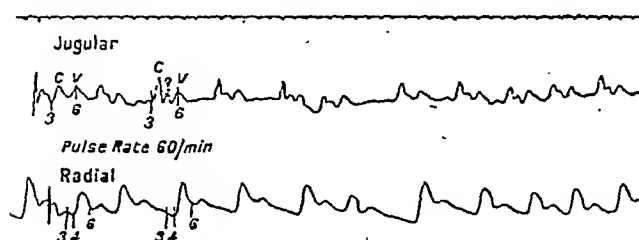


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I have marked "C," "?," "V," I thought were respectively percussion, tidal, and dirotic waves in the carotid pulse.

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3. In the case of the first beat on the jugular tracing, the dirotic wave would be as large as the percussion wave, but this is not so in the radial tracing.
4. Careful measurement shows that the space from the beginning of wave "C" to the bottom of the fall

definite moist rales at the base of both lungs. No enlargement of liver. Urine, specific gravity, 1020; quantity of albumen.

Fig. 9 is a tracing from this case.

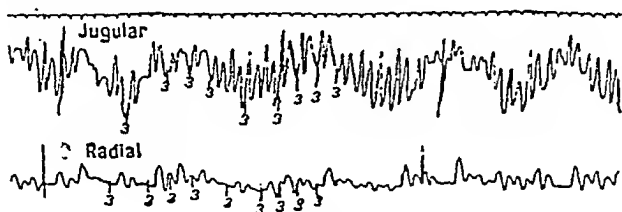


FIG. 9.

I do not think that anyone looking at the radial tracing would have any hesitation in saying, that it was a case of auricular fibrillation.

Fig. 10 is a tracing from the same case.

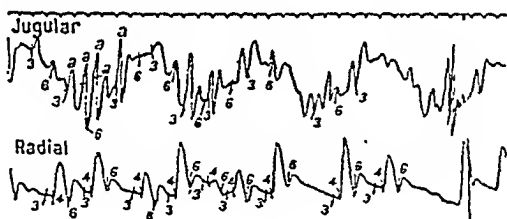


FIG. 10.

A careful examination of these two tracings will show that the condition is one of auricular flutter and not of fibrillation.

In Fig. 9, point 3 usually happens to fall at the beginning of a wave that might be thought to be carotid, but, in Fig. 10, point 3 frequently falls after the beginning of this wave. Point 6, Fig. 10, sometimes falls at the summit of a wave that might be taken as a "V" wave, but it also sometimes occurs at the bottom of this wave. Then note that in Fig. 10 some of the largest waves in the tracing—marked "a"—occur during ventricular diastole, in such a position and in such numbers that they cannot possibly be regarded as a single normal "A" wave occurring before a normal "C" wave. These waves can only be explained by regarding

consequently, one of auricular fibrillation.

The two exceptions mentioned above are:—

1. Great distension of the right auricle, in which the rhythm is normal in type, the auricular wave re-appearing when the distension of the auricle passes off.
2. In certain cases of auricular flutter, when the engorgement of the heart is so great that each ventricular systole sends back large waves of blood through the auricle into the veins.

In both these exceptions the pulse is usually regular, and there is great venous congestion in the neck. In the case of this soldier, the pulse was irregular, and there was no venous engorgement of the neck, so these exceptions need not be considered. I am unable to give an explanation of the cause of the wave marked "?" in Fig. 5.

It is interesting to note that the pulse-rate is slower than is usually the case in auricular fibrillation, when the heart is not under the influence of digitalis. I make the rate only 60 per min. in Fig. 5, and 80 per min. in Fig. 8.

When there is any doubt whether the tracing from the neck is venous or arterial, I believe that most cases will be capable of solution if the tracing is worked out on the above lines.

CASE 2.—This case is one of auricular flutter. It is interesting because the pulse shows that grotesque irregularity which is associated with auricular fibrillation. In auricular flutter, the ventricle usually responds to every second, third or fourth auricular contraction, and although the pulse is often irregular, owing to the number of auricular contractions to which the ventricle responds varying from time to time, there is usually some system about the irregularity, whereas, in fibrillation, the rhythm is continuously irregular.

History of Case 2.—T. A. H., aged 47. Been a soldier for 21 years. Only other previous illness was "rheumatism" when aged 20, and was in hospital two months. Present illness began a fortnight before admission with a cold and shortness of breath when walking up hills. On admission, very short of breath—cyanosed—no œdema; unable to count the pulse-rate. Chest barrel shaped, lungs voluminous, which makes it impossible to map out size of heart. Heart sounds weak, and first sound considerably shortened; faint systolic murmur at apex; no murmur at base. Marked epigastric pulsation;

because the contraction following the interpolated extra systole will be weaker than the contraction preceding the extra systole, on account of the short space of time between the extra systole and the contraction following it. This condition can sometimes only be recognized by the increased A-C interval in the contraction following the interpolated extra systole.

5. The pulsus alternans occurring in abnormal rhythms such as auricular flutter and fibrillation, is not to be taken as a serious sign of exhaustion of the musculature of the heart.

There is, at present, no adequate explanation why the pulsus alternans is of such serious import in cases with a normal rhythm and of little significance in cases with an abnormal rhythm.

I wish to thank Sir James Mackenzie for his kindness in allowing me to reproduce his tracing, Fig. 2. I also wish to thank Professor Wardrop Griffith for his kindness in looking over many of my tracings, and for the help he has always willingly given me.



them all as auricular in origin. We are, therefore, driven to the conclusion that the case is one of auricular flutter, with a pulse irregularity of unusual type. The auricle is contracting at the rate of 300 per min. and the ventricle at 100 per min.

PULSUS ALTERNANS.

The pulsus alternans is another condition which may cause confusion in arriving at a true explanation of a tracing. Mackenzie says, "the pulsus alternans means that form of rhythm in which the radial pulse is perfectly regular, but there is an alteration in the size of the beats." The true pulsus alternans is a sign of serious exhaustion of the function of the heart muscle. But before a grave prognosis is given, it is necessary to bear in mind the following conditions, which may simulate true pulsus alternans and must first be eliminated:—

1. The pulsus bigeminus. This is a condition in which every alternate beat is an extra systole.
2. After an extra systole or a weak ventricular contraction, the pulse may have an alternating character for two or three beats without casting any reflection on the musculature of the ventricle, but if this alternation persists for more than half-a-dozen beats, it must be regarded as a case of true pulsus alternans.
3. In certain cases of complete heart block, in which every alternate ventricular systole coincides with an auricular contraction, the ventricular output is reduced on account of the contracting auricle not allowing the ventricle to contract to its normal extent, because it prevents the ventricle from pulling down the auriculo-ventricular septum. This diminution in ventricular output during every alternate contraction gives rise to an alternation of the radial pulse.
4. A case in which an interpolated ventricular extra systole occurs after every second ventricular contraction, and which is too feeble to reach the radial pulse, will give rise to an alternation of the pulse

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of this he gives extracts from the following reports :—

From the Report of the Asylums and Mental Deficiency Committee of the London County Council for the year ending March 31, 1916, the following is quoted :—

“For the first time since the Council has been the responsible authority decreases are recorded both in the number of patients under reception orders, *i.e.*, patients for whom the County is responsible to find accommodation, and in the total number of lunatics, the decreases being 637 and 950 respectively. The numbers chargeable to the Prison Commissioners (the lowest figure since 1890), on private list and in work-houses, or with friends, have all decreased, while the number in the Metropolitan Asylums Board's institutions is less by 300 than on January 1, 1915.”

From the Second Annual Report of the General Board of Control for Scotland, dated February, 1916, the following sentences are taken :—

“For the first time since the institution of the General Board of Commissioners in Lunacy in 1857, — we have this year to record an absolute decrease in the number of all classes of the insane in Scotland.”

The total number of patients admitted to establishments during 1915 was 148 less than in the previous year, and 75 less than in 1913.

From the Annual Report of the Belfast District Lunatic Asylum, for the year 1915, are quoted Dr. William Graham's comments on the fact that the admissions, although showing a slight increase for the year, compared with the previous year, “show a marked diminution as compared with the average for the past ten years, and the interesting and, at first sight, paradoxical fact is that this diminution takes place at a time when we are involved in the greatest war in the history of the world.”

In summarizing the cases, Dr. Percy Smith has been struck by the large preponderance of the influence of heredity or previous attacks, and his concluding statement is as follows :—

“It would appear that we arrive at the old and

RECENT WORK ON DISEASES OF THE NERVOUS SYSTEM.

BY H. CAMPBELL THOMSON, M.D., F.R.C.P.

*Physician to the Department for Nervous Diseases, Middlesex Hospital;
Physician to the Hospital for Epilepsy and Paralytics, Maida Vale.*

"MENTAL Disorders in Civilians arising in connection with the War" was the subject of the Presidential Address delivered before the Section of Psychiatry of the Royal Society of Medicine, by Dr. R. Percy Smith.¹

Dr. Percy Smith finds the principal factors that have caused attacks of mental disease are as follows:—

1. The onset of war. This had a particularly disturbing effect on those who were on the verge of breaking down or who had suffered from previous attacks of mental disorder.
2. Extreme anxiety about relatives.
3. Financial worries.
4. Sudden change of work with excessive fatigue. In men over middle age this has occasionally led to nervous exhaustion, sleeplessness, depression, delusions and suicidal tendencies.
5. People who have suffered real or fancied annoyances, from the belief that their foreign names or speech have laid them open to the possibility of being looked upon as spies, have sometimes developed definite delusions of persecution.

Other groups arise from the apprehensiveness of air raids, submarine attacks and other possible effects of war.

Perhaps the most interesting part of the address is, however, that which deals with the statistics of insanity during the period of the war. But while the conclusions arrived at cannot yet be considered as final, Dr. Percy Smith brings forward evidence to show that not only has there been no increase, but even a decrease of mental disease, and in support

channels.

It seems doubtful whether domestic animals suffer from the disease, and it appears that the distribution is mainly to be attributed to human beings.

The Incubation Period is uncertain, and is thought to range from two days to two or more weeks, the usual time not exceeding eight days. The period at which the danger of communication seems to be greatest is during the early and acute stages of the disease. From experiments on animals, it is thought that the virus does not, unless under exceptional circumstances, persist in the body for more than four or five weeks, so that persons who have been kept under observation for about six weeks from the onset of the attack, can be regarded as practically free from danger.

Among the general conclusions that Flexner arrives at are :—

1. That the virus is conveyed principally through the agency of human beings.
2. That the chief means by which the secretions of the nose and throat are disseminated are by kissing, spitting, coughing, and sneezing. It is possible, too, that flies may convey infection from one person to another.
3. That general protection can best be obtained by the isolation of patients and by the sanitary control of those who have associated with them, while, of course, care must be taken to disinfect and prevent dissemination of secretions.
4. That there exists at present no safe method of preventive inoculation or vaccination, and no successful method of specific treatment, so that reliance must be placed on general sanitary means for the prevention of the disease.

The subject of "Ocular Crises in Relation to Tabes" has been dealt with by William G. Spiller,³ who mentions that though ocular crises in this disease have been described, they have not been generally recognized, and only a few cases have been recorded.

Spiller records a case of tabes with ocular crises, which he has kept under observation for many years; the patient

well-worn factors in insanity—heredity, previous attacks and stress—and judging from my own limited experience and without the opportunity of considering statistics from the whole of the United Kingdom, it does not appear to me that the war is responsible for causing any great amount of new insanity. The stress or stresses have mainly affected those who were already prepared by heredity, previous attacks, or some predisposing instability, and who might have broken down in any case. On the other hand, in all probability in many cases tendencies which might have led to the development of neuroses or psycho-neuroses have been ‘sublimated’ by useful work, and the final effect may be a strengthening of the mental constitution of the nation.”

INFANTILE PARALYSIS.

A useful article on the nature and manner of conveyance and means of prevention of infantile paralysis has recently been written by Simon Flexner², in response to requests for information on the subject, which, it is stated, are frequently made to the Rockefeller Institute for Medical Research. Among the particulars given, the following extracts will be of interest to those who have to deal with the disease:—

LOCATION OF THE VIRUS.

In people suffering from the disease, the virus is chiefly found in the central nervous system and on the mucous membranes of the nose and throat and of the intestines. It has not been detected in the circulating blood. In healthy people who act as carriers of the disease, it appears, from inoculation tests on monkeys, that the mucous membrane of the nose and throat is the seat of the infection.

It does not seem probable, according to Flexner, that inoculation is conveyed from one person to another by the bites of insects, as at one time was thought possible, though it seems quite likely that flies may carry the infection mechanically from one place to another. The entrance of the virus into the body is generally through the mucous membrane of the nose and throat, from which it finds its way to the central nervous system by the lymphatic

channels.

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had typical symptoms of tabes, and from time to time suffered from attacks of pain in the eyes and adjoining parts in association with tabetic pains elsewhere in the body. During the attacks of ocular pain there were peculiar visual symptoms, which the patient described as flashes of light twisting and assuming the shapes of reptiles, birds, houses, men and different kinds of animals, etc. These crises occurred at irregular times, and sometimes there were repeated attacks in one day, but the visual phenomena never occurred without pain in the eyes or eye-balls. The pain is described as intense, jerking, stinging, and burning, and the eye-balls felt as though they would come out of the orbits. The patient had no mental symptoms; he realized that the visual phenomena of the peculiar animals and things he saw had no real existence; he was totally blind, and could not even recognize daylight.

In commenting on this case, Spiller observes that it resembles three previously reported cases of tabetic ocular crises, in the sudden onset of severe orbital pain with free lachrymation, but differs in the occurrence of visual phenomena, the latter recalling to mind the visual disturbances of some cases of migraine or epilepsy, though they cannot be considered as identical with these. Spiller states there was no evidence of cortical irritation in his case, and he attributes the lachrymation and pain to the result of irritation of the trigeminal nerves, together with, apparently, a simultaneous irritation of the optic fibres, resulting in visual phenomena.

"The Effect of Activity on the Histologic Structure of Nerve Cells" has recently been investigated by R. A. Kocher.⁴

Kocher considers the divergence in the results of former observers is not surprising, and that it has been due to—

1. The difficulty of separating the effects of normal activity from unavoidable shock to the nervous system in killing the animal.
2. Post-mortem changes ensuing between the time of death and complete penetration of the tissue by the fixing agent.
3. The varying chemical action of the fixing agents.
4. The solvent action of materials used in fixing and

embedding, *e.g.*, alcohol, xylene, and paraffin.

5. Effects of chemical reaction between basic or acid dyes used in staining and the different cell structures.
6. The effect of subjecting tissues to high temperatures in the paraffin oven.

Kocher noted the effect of different stages of activity on nerve cells in a series of 15 separate experiments with careful controls, and making every possible attempt to diminish the formation of artefacts. He arrives at the conclusion that no constant difference in the size of the nerve cells or their nuclei can be detected as the result of activity; and in none of his experiments did the histological structure of the nerve cells, after activity to the point of exhaustion, show any constant deviation from that of the corresponding cells of the control experiments.

Kocher points out the importance of these results in relation to the generalizations that have been drawn from the conclusions of previous workers, *viz.*, that fatigue, fear, shock, and exhaustion may lead to permanent damage and even disintegration of nerve cells.

A description of a reflex of the fingers, known as the "Digital Reflex" or "Hoffman's Sign," has been recently described by Dr. Tedrow S. Keyser.⁵

According to the author, this sign consists of flexion of the thumb and fingers when the operator suddenly nips the nail of one of the fingers of the patient. The reflex is found to be practically always present in organic lesions of the upper motor neurons except during the period of "shock," as well as in some functional cases associated with "lively" deep reflexes. The anatomy shows the afferent nerves stimulated have the same segmental origin as the motor fibres innervating the muscles participating in the reflex. Various facts are recorded to show that this reflex belongs to the group of defence movements, in contradistinction to the tendon reflexes.

"Pathological Findings in Two Cases of Paralysis Agitans," by E. Murray Auer, M.D., and Grayson Prevost McCough, M.D.⁶

During recent years there has been a growing tendency

had typical symptoms of tabes, and from time to time suffered from attacks of pain in the eyes and adjoining parts in association with tabetic pains elsewhere in the body. During the attacks of ocular pain there were peculiar visual symptoms, which the patient described as flashes of light twisting and assuming the shapes of reptiles, birds, houses, men and different kinds of animals, etc. These crises occurred at irregular times, and sometimes there were repeated attacks in one day, but the visual phenomena never occurred without pain in the eyes or eye-balls. The pain is described as intense, jerking, stinging, and burning, and the eye-balls felt as though they would come out of the orbits. The patient had no mental symptoms; he realized that the visual phenomena of the peculiar animals and things he saw had no real existence; he was totally blind, and could not even recognize daylight.

In commenting on this case, Spiller observes that it resembles three previously reported cases of tabetic ocular crises, in the sudden onset of severe orbital pain with free lachrymation, but differs in the occurrence of visual phenomena, the latter recalling to mind the visual disturbances of some cases of migraine or epilepsy, though they cannot be considered as identical with these. Spiller states there was no evidence of cortical irritation in his case, and he attributes the lachrymation and pain to the result of irritation of the trigeminal nerves, together with, apparently, a simultaneous irritation of the optic fibres, resulting in visual phenomena.

"The Effect of Activity on the Histologic Structure of Nerve Cells" has recently been investigated by R. A. Kocher.⁴

Kocher considers the divergence in the results of former observers is not surprising, and that it has been due to—

1. The difficulty of separating the effects of normal activity from unavoidable shock to the nervous system in killing the animal.
2. Post-mortem changes ensuing between the time of death and complete penetration of the tissue by the fixing agent.
3. The varying chemical action of the fixing agents.
4. The solvent action of materials used in fixing and

THE TREATMENT OF ACUTE LOBAR PNEUMONIA, WITH SPECIAL REFERENCE TO CYANOSIS, THE BLOOD-PRESSURE, AND THE MAINTENANCE OF THE HEART'S STRENGTH.

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OSLER¹ refers to acute lobar pneumonia as a "self-limited" disease. Generally speaking, there are from five to ten days in which to reach the zone of safety, or to succumb to one of the most virulent of diseases. No other illness, probably, carries off more rapidly or more surely so many apparently robust and healthy-looking individuals. The very suddenness of the catastrophe is, at times, appalling. Time is short, and its shortness makes it imperative that no stone, however insignificant, should be left unturned. Often, in pneumonia, a very small thing will turn the balance—sleep at the requisite moment, an opiate at the right time, or the alleviation of distress at a critical period.

There are certain general principles, the thorough carrying out of which seems to place the patient in an infinitely better position to combat the malady; one cannot assert that these principles always get the attention they deserve. Yet they are more important than any of the so-called specific forms of treatment.

(1) *The Importance of Mental and Physical Rest.*—One essential is the absence of worry. To the pneumonic patient, one source of worry is the anxious-looking relative. However strenuously relatives may strive to conceal this anxiety, the discerning patient soon discovers it, and this brings about a strain of depression. It is therefore advisable that relatives should not visit the sick room frequently, unless the case is hopeless, and it is only towards the end that one can say that a case of pneumonia is really hopeless, for, often, the

to consider that paralysis agitans is accompanied by changes in the ganglia at the base of the brain, and these authors now describe two cases in which the following pathological changes in the region of the basal ganglia were noted:—

Areas of rarefaction containing neuroglia cells and *débris* giving the tissue a moth-eaten appearance.

Clean punched-out holes, possibly excessively enlarged peri-vascular spaces from which the vessels may have dropped out.

Round and oval basic staining deposits, chiefly in the peri-vascular space and adjacent tissues.

Diminution in the number of the external medullary laminal and of the radial fibres of the lenticular nucleus, with some evidence of degeneration of the latter.

Failure of the cells of the corpus striatum to stain well, which latter may possibly have been due to the age of the material.

In neither case was there any gross atrophy of any of the basal nuclei, the most obvious change being the presence of small irregular circumscribed areas of rarefaction of a few neuroglia cells and *débris*. These were not confined to any single region, and though most plentiful in the lenticular nucleus, they were found in the thalamus, caudate nucleus, internal and external capsules, claustrum, corpus subthalamicum, and, in fact, everywhere except the cortex and the red nucleus.

The second type of lesion was found in the shape of round holes with sharply-cut margins, sometimes circumscribed by an overgrowth of glia fibres. They were clean cut as though punched out, and contained no neuroglia or *débris*, and were said to resemble a similar condition, described by Wilson and Cadwalader, in progressive lenticular degeneration.

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 - ² *Journal of the American Medical Association*, July 22, 1916.
 - ³ *Journal of the American Medical Association*, March 18, 1916.
 - ⁴ *Journal of the American Medical Association*, July 22, 1916.
 - ⁵ *Journal of Nervous and Mental Disease*, July, 1916.
 - ⁶ *Journal of Nervous and Mental Disease*, June, 1916.
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looked, and felt to the patient, like sledge-hammer blows from the shoulder. My late friend and teacher, Dr. Arthur Hugh Lister, who died on his way back from serving with the forces in Egypt, used to percuss many of his chest cases with the tips of the first, second, and third fingers of the right hand only. His percussion was almost inaudible, and yet I have never seen anyone who could bring more out of a chest by percussion than Arthur Lister.

The question of the most suitable and most restful position is one to be settled in every individual case. Most cases seem more comfortable and more restful in the recumbent position; but, in my experience, I have found that the breathing is eased, the circulation less strained, expectoration made easier, and the general comfort is greater when the patient is allowed to be recumbent, but with the head and especially the shoulders well raised by means of pillows. Some men treat their cases almost entirely in the sitting position, and this is especially suitable when there is cardiac embarrassment, such as auricular fibrillation, high blood-pressure, obesity, or a good deal of bronchitis. In high blood-pressure cases, the raised head favours sleep, lessens the accumulation of expectoration, and helps to prevent any hypostatic congestion. Cardiac conditions, in general, demand this raised position; any slipping down low in the bed causes a sense of suffocation, and makes the patient start up suddenly. This feeling of suffocation brings with it an apparently undue sense of fear and anxiety.

(2) *The Importance of, and Necessity for, Adequate Sleep.*—

In my series of cases I think, probably, one of the worst prognostic signs has been insomnia, *i.e.*, persistent insomnia. I have seen cases of pneumonia that, through the whole course of the illness, have practically not slept at all; but I cannot remember having seen such a case recover. Sleeplessness seems to have a paralytic effect upon the general state of the pneumonic; its specially vicious effects seem to make themselves manifest in the circulation most of all. General exhaustion is produced, and, with this, a lowering in the vasomotor tone.

The cause of the insomnia may be cough, pain, an uncomfortable bed, nervous tension, general discomfort, or restlessness. Abdominal distension from flatulence may be

most hopeless looking case will have a crisis and pass into safety.

All possible worry and mental activity or strain should be kept away. I have known a severe case of pneumonia trying to direct her household affairs from her bed!

Another thing that should be concealed from the patient is the name of the disease. The very word "Pneumonia" strikes a chill to the heart of many people. Only the other day a lady said to me: "But *all* cases of pneumonia die, don't they?" This, or very nearly, is the impression many of the laity have. It is no untruth to tell the patient that the lung has become congested, or that there is some inflammation in the side. This is much more reassuring; but to call the disease by its real name often brings about a feeling of anxiety and hopelessness.

- Complete *physical* rest should be insisted on. One has frequently seen pneumonic patients reaching out for the vessel in which to expectorate. The result of this and of similar actions causes a greater shortness of breath, and a further call for energy from an already over-laboured heart.

Frequent medical examinations of the back of the lungs are also to be deprecated. These are unnecessary, and unduly exhaust the patient. Once the diagnosis is certain, no patient should be further exhausted for daily examinations of the back. If sleep is obtained, the circulation maintained, and the patient holding his own generally, then I venture to say that the lungs will look after themselves. It is distressing to see an obvious case of pneumonia turned over from side to side, made to take deep breaths, and say "99," morning and evening. Nothing is more fatiguing to the patient; it is one of the small things that may turn the balance the wrong way. No careful physician ever does this frequently; he will confine his stethoscope more to the cardiac region, to the nature of the cardiac sounds, and to the rhythm of the heart. He will watch more for cardiac dulness extending to the right of the sternum, fulness of the liver, and engorgement of the veins in the neck.

Percussion of the chest should be carried out gently and lightly. This will convey more information than heavy percussion. Nothing distresses a patient more than heavy percussion; one has often seen patients wince over what

looked, and felt to the patient, like sledge-hammer blows from the shoulder. My late friend and teacher, Dr. Arthur Hugh Lister, who died on his way back from serving with the forces in Egypt, used to percuss many of his chest cases with the tips of the first, second, and third fingers of the right hand only. His percussion was almost inaudible, and yet I have never seen anyone who could bring more out of a chest by percussion than Arthur Lister.

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another cause, as well as general gastric discomfort, diarrhoea, excessive expectoration and the continual cough engendered thereby, high temperature, and the pain of pleurisy.

For the pleuritic pain, 10 to 30 minims of nepenthe may be given. This preparation is much less apt than morphia to cause sickness or obstinate constipation. There is no danger in giving this drug in the earlier stages; it is certainly safer than the exhaustion produced by the pain. In the later stages, it is generally not required, the pleuritic pain having usually disappeared by this time. Hot fomentations, tightly applied, are of great service, for they help the inflammation and ease the pain.

If the sleeplessness is persistent, hypnotics are essential. The following, on account of their safety, are the most suitable. Paraldehyde, in doses of ʒi-ii , or more, is best given in capsule, or a *single* dose, prescribed in mixture form flavoured with tincture and syrup of oranges. It has no depressant cardiac action, but may occasionally cause excitement, or gastric disturbance. A very useful preparation is chlorobrom, half to an ounce in water. Chloralamide is useful in a dose of from 30 to 45 grains, dissolved in warm, but not hot, brandy; fifteen drops of dilute nitro-hydrochloric acid aid its solubility. Urethane (ethyl carbamate), 20 to 60 grains, dissolved in water, is mild, safe, and specially suitable for children. Bromidia contains chloral, and not more than ʒi should be given. Adalin, dose 15 grains, followed by a hot draught, was, generally, in my experience, efficacious, but can scarcely now be procured. Veronal, medinal, and similar preparations are unsafe. In selected cases, the following is very useful:—nepenthe, 5 to 10 minims; Sod. bromid., grs. 20 to 40; chloral hydrate, grs. 5 to 7; tinct. hyoscyamui, 20 to 40 minims, spt. chloroform, 15 minims; syr. tolu, ʒi water to 2 ounces. Trional, in dose of 15 grains, may be used, but neither tetronal—the most toxic of the group—nor sulphonal.

Whatever hypnotic is used, sleep must be obtained, or the patient will almost certainly succumb to the ensuing exhaustion. An ounce of good brandy may act where all else fails; on the other hand, it may produce wakefulness.

(3) *The Importance of Open-air Treatment.*—Deficient aeration of the blood is one of the dangers of pneumonia. It

means that deficient nutrition of the tissues will follow, especially of the cardiac musculature. In my experience, early and persistent cyanosis is an unfavourable sign. The alcoholic cyanose easily, and so do many of the sthenic type, particularly those with high blood-pressure. I believe the results of open-air treatment are very good. With probably the greater part of one lung solid, and practically functionless for the purpose of aerating the blood, the vital necessity for a generous supply of oxygen seems obvious. Yet, for fear of further chill, or some such myth, many cases are still treated by anything but the complete open-air method. It is soothing to the patient, eases the respiration, reduces cyanosis, and is conducive to sleep as well as to the lowering of the temperature by rational means. The patient should be placed right in the window, which is kept opened wide, top and bottom, day and night. If an open-air chalet can be obtained, so much the better. There is no objection to a good fire; it helps still further to ventilate the room and to warm the air. Excess of very damp and very cold air should be excluded only in the very old, the very feeble, and those with a marked bronchitic tendency.

Open air appears to be a powerful prophylactic agent. In a hospital to which I am attached, where there are 300 cases, always changing, all more or less in a poor or tuberculous state, in the last eight years there have not been more than six cases of acute pneumonia. It is a hospital for children, but there are a good many of the inmates in their teens and over. Complete open air is carried out through the whole institute. Over 100 of the patients are always confined to bed, mostly for long periods. One of the six cases was tuberculous pneumonia. Broncho-pneumonia was more common, but only very slightly so, which seems very unusual where there are 300 cases, mostly delicate children. It suggests an absence of germ activity, and probably a greater resisting power. Although, treated in general (open air) wards, no two cases have ever occurred together, or even near the same time. This points to a lesser risk of others becoming infected, probably on account of the open air. An experienced medical man, to whom I put the question: "How many cases of acute pneumonia per annum should you expect in this institution, with its 300 cases?" at once

replied: "20 cases." He was aware of the circumstances. The actual number was less than one per annum. This is an excessively low percentage, and I can account for it in no other way than through the open-air system.

(4) *The Importance of a Correct Diet.*—From what one has seen, one cannot help feeling that there is a tendency, sometimes, to overfeeding. Large quantities of milk are sometimes consumed, neither diluted, peptonized, nor citrated. Adequate nourishment is imperative, but it is not advisable to thrust four, five, or more, pints of raw and unprepared milk on the patient every 24 hours. The method engenders flatulence, and may cause very considerable cardiac embarrassment. At the first sign of abdominal distension the milk should be citrated, and if this does not speedily get rid of the trouble, it should be greatly reduced or eliminated from the diet almost altogether. Many digestions will not tolerate the ingestion of large quantities of fluid, especially if that fluid happens to be milk. Milk should practically always be citrated, not only on account of the much finer curd produced, but for the virtues the citrates possess in different directions. Flatulence and distension will cause insomnia, and adversely affect the digestive, circulatory, and respiratory systems. Acting through the heart, they may even be the cause of death.

Often the quantity given at a time is too large. One has often seen a kindly but inexperienced nurse assiduously trying to get half a pint of milk down a pneumonic, already gasping for breath, almost in one gulp. No pneumonic should be allowed to drink enough at one time to make the breathing shorter at the end of the drink than at the beginning. Small quantities and often should be the motto in feeding.

The most digestible and most easily assimilated foods should be given: raw eggs, beef juice, and the various peptones on the market. These cause no distension, and they are powerful general nutrients. Casein foods are also of value (vitamogen, vitafer, herogen, lecigen, etc.). Chicken or veal broth are both useful; they contain less purin than other forms. They should be given in small quantities only. If a patient feels inclined for it, the minced breast of boiled chicken, a lightly boiled egg, or a small quantity of sole, cooked in milk, may occasionally be given. These form a welcome

change to the eternal slops. I have known a patient, with fairly sharp pneumonia, ask for and enjoy a meal of "kippers," bread and butter, and tea. He was none the worse for it. Little harm ever arises from indulging patients in these rather odd fancies; one may stick too closely to the old-fashioned method of pouring pints of starchy, sloppy, disagreeable, and gas-producing foods down the patient.

(5) *The Importance of a Suitable Environment, and of Bright and Cheerful Surroundings.*—How often does one see a patient fighting the sharpest of all fights in a dull monotonous-looking room, where rarely a ray of sun penetrates or a flower in bloom brightens! This is due only to a lack of grasping detail. A little more thought, a touch here and there, and the whole scene can be changed, and with it, perhaps, the outlook of the patient. The mind in illness is more sensitive to impression than in health; a bunch of roses or a jar of carnations may gladden the eye more than many an expensive luxury. The sunniest room in the house should be chosen; both mentally and physically this is strongly desirable. It should be spotlessly clean, free from cumbersome and dust-collecting trappings, and the bed linen fresh and sweet. If possible, the outlook from the window should be bright and cheerful; one knows the monotony and the depressing effect of always gazing at a dull brick wall.

TREATMENT OF SPECIAL SYMPTOMS.

1. *The Pain.*—In the earlier stages a small injection of morphia (gr. $\frac{1}{8}$ – $\frac{1}{4}$) may be given, along with a small dose of atropin ($\frac{1}{150}$ – $\frac{1}{200}$). The opiate will do less harm than the pain. Hot fomentations, sprinkled with turpentine, should be applied, and over these an elastic binder put on as tightly as possible, without interfering with free movement of the sound lung. On the outside of this a rubber bag, containing boiling water—if the pain, as is general, is in the side—should be placed in close apposition. This keeps the fomentation hot, and is, in itself, a great comfort. If the pain in the side is very severe, the lower ribs may be lightly strapped with adhesive plaster, two strips of $2\frac{1}{2}$ inches wide being generally enough.

2. *Persistent Cough.*—This disturbs rest and exhausts the

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to prevent accumulation of fæces in the bowel. Drastic purgatives should be avoided, and, in the feeble, care should be taken with enemata, which are liable, at times, to cause severe collapse. Glycerine suppositories are often as efficacious, and do not have the same tendency to produce collapse. Any straining should be avoided—sudden and grave syncope may occur. Phenolphthalein, in doses of from 1 to 5 grains, once or twice daily, has, perhaps, fewest drawbacks. It rarely causes griping, and produces, generally, a soft and easy evacuation. If the rectum is inclined to become loaded, cascara evacuant, because of its greater action on that section of the bowel, may be given, either singly or along with the phenolphthalein, the doses being suitably graduated. If the motions are offensive; or inclined to be clay-coloured, $\frac{1}{8}$ of a grain of calomel may be given every half hour for four or eight doses.

6. *The Care of the Mouth.*—On account of the danger of re-infection, or of secondary infection, oral hygiene is, probably, more important in pneumonia than in any other disease. It is one of the triumphs of nature that, with all the pyorrhœic mouths and septic tonsils one meets with, there is not greater secondary infection than exists. At the same time, one cannot help feeling that many of the acute infections are directly traceable to this prolific source of general infection. Many acute pneumonias have very septic mouths, and the pulmonary condition accentuates the activity and virulency of the oral sepsis; hence the need for active interference. The patient cannot gargle, but the nurse can see to the regular cleansing of the teeth and the washing out of the mouth. A soft brush, holding plenty of either "euthymol" or "kolynos," should be applied to the teeth and gums, morning and evening; this can be done without the slightest disturbance to the patient. The patient should rinse his mouth out several times daily. A most refreshing preparation for this is the "dental effervescing tablet." Another very good and agreeable mouth wash is composed of the following: listerine, glycothymoline, liq. hydrogen peroxide, of each an ounce and a half, sat. sol. acid boric to eight ounces. An equal quantity of hot or cold water to be added for use.

7. *Abdominal Distension.*—This at once calls for cutting

patient. No harm will result from using heroin, with care. Syrup cocillana co. is an efficacious preparation; each drachm contains, among other sedative ingredients, $\frac{1}{32}$ th of a grain of heroin hydrochlor; \mathfrak{Zi} or \mathfrak{Zii} may be given occasionally. Care must be taken, in cases in which there is a danger of sputum collecting in the chest, and in those with very feeble power of expelling any such collection. One of my old teachers used ammonium carbonate as a routine measure. To him it was a regular stand-by, and his results were always regarded as unusually good. It is a rapid diffusible stimulant, and a strong expectorant. Combined with small doses of sodium iodide the expectoration is loosened, and more easily expelled. In selected cases, from 5-10 minims of tincture of nux vomica may, with advantage, be added. Flavoured with spirit of chloroform, ext. glycyrrhizæ liq. and syrup of tolu, the mixture loses much of its unpalatability. This prescription is of great service in clearing up pulmonary congestion slow to disperse itself.

3. *Difficult and Hard Expectoration.*—The above prescription may be of much use, but what is probably more useful is a combination of the old-fashioned remedies, potassium citrate, spt. æther. nitros., liq. ammon. acetat. and camphor water. A dose of from 5-10 drops of balsam of Peru, given three times daily on a lump of sugar, is also useful.

4. *Furred Tongue and Gastric Sluggishness; aiding Assimilation.*—The furred tongue will probably persist, but the gastric mucosa can be helped. The gastric juices, in general, seem to be deficient. These can be aided by giving the following, which helps to prevent distension, and seems greatly to improve the digestive functions:—

R. Liq. Arsenici Hydrochlor.	-	-	-	\mathfrak{M} $\frac{1}{2}$ -1
Tr. Capsici	-	-	-	\mathfrak{M} 1
Tr. Nucis Vomicae (1914)	-	-	-	\mathfrak{M} 5-10
Acid. Nitro-hydrochlor. Dil.	-	-	-	\mathfrak{M} 15-20
Liq. Helalin et Pepsin Co. (Oppenheimer)				\mathfrak{Zi} .
Syr. Aurantii	-	-	-	\mathfrak{Zi} .
Aq. Destillatæ	-	-	-	\mathfrak{Zi} .

Misce. Ft. mist. Sig: ter in die post cibos.

Another very useful combination is 10 grains of lacto-peptine, along with 5 or 10 grains of taka-diastase.

5. *Constipation.*—Great care should be exercised in order

through toxæmia and lack of energy and nutriment to the walls. Cyanosis should, therefore, be as vigorously combated as possible.

It is remarkable how some cases will rapidly run to a fatal termination without, practically, any cyanosis at all. Others cyanose almost from the beginning, and yet get through. Alcoholics cyanose probably the most easily; next, those with high blood-pressures and emphysematous chests. Any cardiac lesion, aortic reflux excepted, but especially mitral stenosis, still more so when associated with auricular fibrillation, will accentuate the ease with which a patient becomes cyanotic.

Early steps should be taken to minimize this very real danger. Open air treatment will often greatly lessen or obviate it. But in many cases we have to rely on pure oxygen. It is of little avail waiting till a patient is becoming deeply cyanosed and nearly moribund, before introducing oxygen. It should be used, and freely used, on the *first* approach of cyanosis—turgescence of the malar venules, slight blueness of the lips or the tips of the ears, and a general but mild facial duskiness. Not so long since, oxygen used to be regarded, and still is regarded by some, as a last resort, and to the friends its use was a sign that the doctor's hope was vanishing, if it had not altogether vanished.

Oxygen is expensive; but where it can possibly be afforded, three or four 40-foot cylinders should be placed in various parts of the room, near the bed, and allowed to give off continuous gas. Correct tubing attachments will prevent hissing from the escaping gas. The method should be begun early, and kept up during the illness; in cases in which I have employed it, the patients have expressed very distinct relief and benefit. But apart from filling the room as much as possible with the gas, it is also necessary to use it in more concentrated form—the more obvious the cyanosis the greater should be the quantity and concentration used. It may be warmed and bubbled through medicated fluids.

The method proposed by Dr. Leonard Hill, and used, later, by Sir James Mackenzie² in cardiac cases, is deserving of further trial. Hill employs a mask, which fits the face. Sir James Mackenzie has used a converted hat-box for the same purpose. Into the mask or box, oxygen is allowed to

off milk and starchy foods. If the distension is one preceding dissolution, as often happens, it is too late to do anything, but some cases distend almost from the very early days. A small turpentine enema may give relief; but it is mainly a question of diet. Peptones, Brand's essence of chicken or veal, albumen water, etc., should be substituted. If the distension still persists, capsules of izal, cyllin, kerol, or cachets, containing 5-7 grains of naphthalene tetrachloride, should be given.

8. *Highly Concentrated Urine, with Heavy Lithuric Deposit.*—This requires the free use of fluids, barley and lemon water, and of the citrates, which can usefully be incorporated with the milk.

9. *High Temperature.*—Persistent high temperature brings about a sense of great discomfort and a feeling of restlessness. The use of antipyretic drugs—except, perhaps, quinine—is irrational, for many of these are cardiac depressants. Of all therapeutic measures, nothing is more efficacious, or brings about a greater sense of comfort, than *thorough* sponging. There is no danger in doing this as frequently as may be necessary—half a dozen times in the day—if it reduces the temperature and makes the patient more comfortable and more inclined to sleep. Tepid water is, probably, the best, to which some ammonia or eau de Cologne has been added; cold or even iced water may be used, depending on the comfort produced, the strength of the patient, and the height of the temperature. Personally, I think sponging should always be employed, thoroughly and frequently, when the temperature is over 103° F. in the mouth, and at least two or three times daily when it is over 102°. It is an excellent hypnotic—but it must be done thoroughly. The use of quinine will be referred to later on.

10. *Cyanosis.*—The combating of this is one of the most vital points in the treatment of pneumonia. It spells deficient aeration, and that means deficient nutrition, in which the cardiac musculature will participate. If the cardiac muscle, already probably poisoned, has starvation added to its burdens, the patient has to be very strong indeed to pull through. We know that, in a great number of cases, death in pneumonia comes about through the heart—either through mechanical obstruction, or, what is more likely,

eration takes place; recent research shows that this is not so. But it is certain that the heart gives out, and practically no other illness has the same effect. Death in pneumonia is not generally purely toxæmic or pulmonary; it is generally a circulatory death. This is shown by the ever-weakening pulse with its terminal irregularity, the increasing size of the right heart, the engorged veins in the neck, and the blood-turgid liver.

We do not know definitely why the heart gives out so quickly in this fell disease; we know it becomes rapidly exhausted, so rapidly as to be at times nothing short of appalling. Just recently an eminent surgeon passed away after three days' illness, and every physician can quote such cases.

The explanation may be that there are a combination of circumstances that co-operate in unison against this organ. These are: first, mechanical obstruction—pulmonary and cardiac; secondly, toxæmia, often virulent; thirdly, cardiac malnutrition, the greater the more intense the cyanosis is; and, fourthly, the great curtailment of the *diastolic* rest of the heart, which quickly leads to exhaustion. One thinks of the heart as working all day long; as a matter of fact, its ordinary diastolic periods occupy no fewer than 13 out of the 24 hours. So that, normally, the heart is resting 13 hours per day. When the heart is rapid, the rapidity is at the expense of the diastole, or rest, of that organ.

It is the combination, possibly, that overwhelms the heart. Certainly, no one factor operating for so short a time would be likely to do it. Attacked on all sides, and by many different weapons, the heart *has* to give out. Vasomotor paralysis may be another important factor in bringing about the cardiac failure, as well as the accumulation of deleterious waste products.

THE VALUE OF DIGITALIS IN PNEUMONIA.

Digitalis as a stay in pneumonia is useless, and worse than useless. Many may take exception to this dogmatic statement. One can scarcely pick up a text-book on medicine without finding under "The treatment of Pneumonia" something of this effect: "When the heart shows signs of failing, digitalis should be employed." But, by the time

stream freely. This is kept up for from 10 to 20 minutes. In pneumonia, a drawback would be the possibility of producing a good deal of coughing. This happens at times; on the other hand, it may soothe the cough. Hill states that by this method a far greater amount of oxygen is taken up into the blood than by any other. In his heart cases, Sir James found that the only cases to obtain benefit were those showing evidence of cyanosis.

Certainly, under an influence of an atmosphere rich in oxygen, cyanosis will entirely, or, in great part, disappear. This can only do good; and there are good reasons for thinking that many of the so-called failures with oxygen were failures brought about by faulty technique; *i.e.*, too short administrations and too weak a concentration.

If the concentration is not too great, more or less continuous oxygen gives good results. But the patient must be given to understand, first of all, that the use of the gas is no last resort, but a form of treatment that, nowadays, is begun early, and is used for the purpose of bringing comfort and hastening the recovery.

THE HEART IN PNEUMONIA.

If the heart can be kept right in pneumonia, I think one may safely affirm that the lungs will generally take care of themselves. Such complications as empyema will, at times, ensue. But the heart is the real danger; it is through the heart that most cases go wrong. The pulse-rate will not kill—except through the heart; the toxæmia will not generally kill—except through the heart; the consolidation of the lung will not kill—except through the heart. Everything seems to be through the heart, and the heart seems to be everything. An exophthalmic goitre runs a pulse as high almost as any pneumonia for a year or more; a septicæmia may go on profoundly toxic for months, and with a high pulse-rate too, and yet recover; a phthisical lung may be as consolidated almost as a pneumonic lung, and the possessor live for long. Yet, without extensive—indeed, with but slight—consolidation, in from three to seven days a straightforward case of pneumonia is dead.

It is not that the valves give out, or that fatty degen-

idea. With all the glowing—and ignorant—accounts of the wonders of digitalis detailed to us in our books on *materia medica*, perhaps we were not altogether to be blamed. I resolved that I should try and test this in practice. I gave it six years good and honest trial. It was pushed—by the mouth, hypodermically, and by the veins; I can honestly say I never saw one case, out of a large series, benefited to the least extent. One was, therefore, forced to the conclusion that the drug is utterly useless in the presence of a distinct temperature. This reason alone practically excludes its use in pneumonia.

Summarized, these conclusions are as follows:—

1. Digitalis appears to have no specific effect on a heart accelerated in rate through the absorption of bacterial toxins.
2. Digitalis appears to have no specific action on the heart when there is definite elevation of temperature.
3. Digitalis given by hypodermic injection has no specific action on the heart on account of the drug evidently not being sufficiently absorbed.
4. Digitalis given in a single dose appears to have no specific effect on the heart; the specific effect on the heart may not be evident until from three to ten days have elapsed, the dosage during this time not being lower than 45 to 60 minims daily.

The fear is that digitalis may be relied upon, to the exclusion of other and more valuable methods.

Nothing can be said in favour of strychnine, except in selected cases. I believe its *general* employment in unselected cases is unscientific and injurious. Toxæmic heart failure is now held to be often due to vasomotor paralysis; the vasomotor centres become more or less exhausted. Strychnine acts on these centres, but when they are already tired out or poisoned, whipping them up can only bring about greater exhaustion still. Many pneumonias, during the course of the illness, suffer from shock—or, at least, what seems comparable to shock. In shock, strychnine is contra-indicated; it cannot improve the condition, but may make it worse. Yet,

the heart shows "signs of failing" the patient is dead, probably two days before the digitalis could act, even if, in this disease, digitalis was a specific remedy for the heart. I have frequently heard people remark on the great improvement on the patient and on the pulse after a single dose of 10 minims of the tincture, and these were trained observers. Such apparent results are but coincidence. To those who hold such views, and to those who desire to know the value, the use, and the limitations of digitalis, one can but commend the illuminating writings of Sir James Mackenzie. In these will be found what digitalis can and cannot do.

A dose of digitalis is not comparable in rapidity of action to a dose of morphia or of castor oil. To realize the mode of action, the *slowness* of action, and the specific action of digitalis, one must try its effect on a case of mitral stenosis with auricular fibrillation. In no cardiac condition is digitalis so specific or so certain in its action; this is *the* field for digitalis. Yet here, in its own province, doses of 60 minims of the tincture have to be given *daily* for from four to 12 days in order to obtain a reaction. But this reaction is nothing short of marvellous—from the very extreme of cardiac failure the heart marches on to perfect safety and a pulse-rate of 66 to 70. But 10 drachms of tincture of digitalis have probably been necessary to produce the result. Few pneumonics would be alive to-day had we to wait for the result of digitalis medication.

On a heart in the grip of a poison, such poison as may be generated from the absorption of bacterial products, digitalis has no effect whatsoever. In many such hearts I have pushed digitalis (3i daily for 5, 7, or 10, or more days), and I have never once seen what I could recognize as the slightest improvement or reduction in rate. Yet these were cases in which the temperature was not elevated. I have injected it hypodermically in heroic doses, and into the veins, but the result has been exactly the same, viz., *nil*.

Professor David Finlay, lately Professor of Medicine in the University of Aberdeen, taught his students that, when any considerable rise in temperature was present, digitalis would exercise none of its specific effects. Some of us, in our youthful excess of wisdom, thought this was probably only an

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and with a respiratory rate of over 50. One lung was nearly solid; needless to say, he did not recover.

Posture may save cardiac embarrassment, and the heart can also be spared by keeping the temperature down by frequent sponging. Its action can be saved further embarrassment by preventing, chiefly by diet, any abdominal distension. This may cause serious cardiac distress—even death.⁵ The removal of pain is practically confined to pleurisy. Opiates in the earlier stages may prevent much general distress and cardiac disturbance. Again, by keeping the excretory functions active, by combating oral sepsis, and by aiding the expulsion of purulent pulmonary collections, toxæmia may be lessened, and the heart thus saved. Endeavouring to prevent, and, when established, trying to combat, cyanosis will promote the supply of nutriment to the myocardium—one of the most vital essentials. All possible means to secure adequate sleep must be taken, for a sleepless restless night produces decided exhaustion in the heart.

Excessive cough throws an added strain on the heart, throwing extra pressure on it, and accelerating the rate, apart from adding to general exhaustion. Any unnecessary cough should, therefore, be prevented as far as is safe and possible.

Most important of all is the continual supplying of correct nourishment to the heart. Nothing is more vital, and more essential, than the maintenance of the cardiac strength by appropriate means. Sir Lauder Brunton⁶ wrote: "The best nutriment for the heart is, of course, well aerated blood, with a proper proportion of nutrient matter and few waste products."

Hence the enormous importance of endeavouring to combat cyanosis. Cyanosis not only brings to the heart-muscle deficiently aerated blood, but allows a greater accumulation of waste products, which has been found to be one of the most exhausting agents of the heart's strength.

All albuminous substances do not act as cardiac nutrients; serum-albumen does, but neither egg-albumen, casein of milk, syntonin, nor peptone.⁷ But there is no longer any doubt that in glucose we have a nutrient that exercises a most beneficial effect upon the heart. It may be given by the mouth the rectum, or subcutaneously. For the dosage, and

probably, no drug is more frequently resorted to.

In shock, post-pneumonic, post-operative, or from other cause, excellent results may be got from combining the following :—

1. An hypodermic injection of morphia.
2. Compression of the splanchnic area.
3. Intravenous injection of adrenalin—or, better still, pituitrin—and saline.
4. Heat to the trunk and limbs.
5. Tight bandaging of the legs, and raising the foot of the bed, in order to keep blood in the vital centres as much as possible.

It is doubtful whether adrenalin administered by the mouth can have anything but a purely local effect. Injected subcutaneously, there is also some doubt as to its rapid absorption.⁴ Intravenous injection along with saline is more rapid and more certain in action.

It seems certain that, in selected cases, strychnine may be most beneficial, especially as a respiratory stimulant. But, as a case becomes worse, to keep on increasing the drug, especially when there are signs of collapse and vasomotor paralysis, cannot, in the light of modern research, be justified. There are many reasons for withholding this drug as much as possible in this particular type of case.

If digitalis is of no avail, and strychnine is useful in selected cases only, what are we to fall back upon when the heart shows signs of failing or of weakness? The real truth is that there is no specific to fall back upon. To the end of time, the heart is likely to give out in pneumonia. But much can be done. Care and precautions should be taken from the *beginning*, which will save our having to fall back on less effectual agents.

In pneumonia, the cardiac reserve is strained to its utmost. Much can be done to save further exhaustion. Thus, absolute mental and physical rest must be procured as much as possible. It is through carelessness during the first 48 hours, when exhaustion has not yet set in, that many give the heart its first fatal blow. Some years ago, I saw a strong, robust man, who had been ill for three days before getting a doctor. He was sitting by the fire fully dressed, cyanosed,

and with a respiratory rate of over 50. One lung was nearly solid; needless to say, he did not recover.

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technique the reader is referred to Martindale (16th edition).

Of more use than glucose is pure cane sugar; beet sugar has not the same effect. In heart affections, there are many remarkable successes reported, and my own experience of its use has been very good. I believe in pneumonia it sustains the heart's strength as nothing else will. The dose must be large, from $\frac{1}{4}$ – $\frac{1}{2}$ lb. daily, given at regular intervals during the 24 hours. It is sometimes recommended that it should be eaten slowly, but to some this is very distasteful. It may be dissolved in water, to which may be added some bitter tincture. Coffee is also helpful to overcome the sweet taste. Experimentally, it has been proved that dextrose possesses the power of nourishing and sustaining the heart muscle; in practice, this will be found equally true. The method is applicable to any other type of case, toxæmia or malnutrition in which the cardiac musculature is the seat of weakness.

The signs of heart failure in pneumonia generally conform to a type. They are : rapidity, feebleness, or irregularity of the pulse; sudden displacement outwards of the apex beat; increase of cardiac dulness to the right of the sternum; fulness of the liver; engorgement of the veins in the neck and increase in the pulsation in this region; weakening of the second pulmonary sound; loss of tone in the first sound in the mitral area, and increasing cyanosis. The second pulmonary sound is a most reliable guide; distinct weakening in this is of grave prognostic significance.

The brunt falls on the right side; when signs of embarrassment appear on this side of the heart, immediate treatment should be adopted. Embarrassment here produces a vicious circle, and the right heart does not easily or for long stand the nature of the strain thrown upon it. Engorgement and venous stasis of various organs quickly appear and add a serious aspect.

Over the engorged liver, leeches may be placed, and may give great relief. But infinitely more certain and more efficacious is venesection, 10 or 15 ounces being taken; the more quickly and freely the blood is allowed to flow, the greater the relief. As large a vein as possible should therefore be opened. Under local anæsthesia, a free incision should be made, and the vein dissected out. In

many of these cases the heart is receiving more blood than it can deal with, and the relief afforded is very great.

If signs of failure still persist, with or without bleeding, preferably after bleeding, there are still two preparations we may fall back upon—adrenalin and pituitrin. A large drop in the blood-pressure and increased rapidity of the pulse are indications for their use. The absorption of adrenalin by the stomach and after subcutaneous injection being doubtful, it is more certain to adopt the intravenous method. From 5 to 10 minims of the 1 in 1,000 solution should be introduced into a vein, diluted with saline solution as circumstances dictate. One drawback is the somewhat transitory effect; so that its use is limited more, perhaps, to states in which there is collapse and a rapid effect on the heart is necessary. Transitory though the effect may be, it seems often just to restore the balance, and the effect on vasomotor paralysis, from what one can judge, is very good. I have seen many a grave condition apparently recovered from under the use of adrenalin. Probably the smaller dose is to be preferred. It will act infinitely better on a pressure lowered by disease or by collapse than on a normal pressure or on a normal heart, on which the effect may be almost negligible.

To pituitrin the last remark also refers. The effect of this drug is much more lasting, and the result on the failing heart is an improved tone and an increase in the power of contractility. The resulting diuresis is very useful in helping to get rid of the waste products of toxæmia. Over adrenalin the more prolonged action of pituitrin is a great advantage, and it may be given intramuscularly with certainty of absorption. Not less than 1 cc. should be given. Repeated doses may be given for keeping up diuresis; but to get the full benefit of the pressor effects, further doses should not be given under 8, or probably 12 hours.

In several cases of acute cardiac failure, in which there were no rise of temperature and no pulmonary complications, apart from pulmonary œdema secondary to the cardiac failure, I have given a full dose of digitalis ("Digalen" was most frequently the actual preparation used), along with 1 cc. of pituitrin intravenously. One case only was a complete failure. In the other cases, within five

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minutes there was the astounding drop in pulse-rate from 140 beats per minute to 70. It is a striking clinical phenomenon.

In pneumonia, a common terminal mode seems to come about simply through failing contractions. The ventricular force gradually weakens; the extremities become cold, and signs of venous stasis appear. During this phase, there may be quite a drop in the pulse-rate; it is a deceptive and a fatal slowing. The wearied ventricle seems unable longer to carry on the unequal fight; its increased rate has been powerless to overcome the obstructions. Œdema of the lungs sets in, and fluid is shed into the pleural and pericardial cavities.

At this time, or before it, there frequently appears a terminal irregularity of the pulse. With the slowing of the ventricle, I have often observed irregular premature contractions—possibly here a manifestation of toxæmia. At other times the irregularity has been comparable to that of auricular fibrillation. At other times, I believe I have been able to make out pretty distinct evidence of alternation of the pulse; but for want of instrumental help it is difficult at any time to make certain of this. It seems likely, however, that this may be a more frequent mode of terminal heart failure than has been supposed. Certainly sudden death is not uncommon. Lewis^a states that: "It has been seen in pneumonia during the pre-critical stage." His summing up of this portentous state would be hard to beat:—

"It ranks with *subsultus tendinum*, with *optic neuritis*, with the *risus sardonicus*, and other ill-omened messengers. It is the faint cry of an anguished and fast failing muscle, which, when it comes, all should strain to hear, for it is not long repeated. A few months, a few years at most, and the end comes."

THE BLOOD-PRESSURE IN PNEUMONIA.

The occurrence of pneumonia in robust-looking individuals with a raised blood-pressure is very common. It is a frequent mode of termination in states such as hyperpiesis, the various forms of chronic nephritis, and secondary to other vitiated general states. It is in the victim of hyperpiesis that many of the most sudden of tragedies occur. To the outward eye many of these people have a florid, apparently

healthy and physically flourishing appearance. Yet for some years the heart, now somewhat enlarged and, consequently, its total reserve diminished, has been labouring against an increased arteriolar resistance. Allbutt⁹ protests against "the accusation of these striving hearts of complicity in the arterial disease . . . They are stout and faithful to the end, even in defeat." However true this may be in a general way, these hearts do not stand the strain of pneumonia well. Three, four, five, or six days, and the end comes with startling suddenness.

These patients cyanose very easily, and do not readily tolerate the effects of toxæmia; undue breathlessness is only too easily excited. A great part of the cardiac reserve has been used up in overcoming the resistance, to which for long it has been subjected. These hearts can, therefore, be called upon less than a normal previously unstrained heart.

One of the great dangers in pneumonia is a sudden drop in the blood-pressure. When the pressure is excessively high, and the patient could get on more comfortably and better with a lower pressure, a drop may then do good, in so far that it may relieve the strain on the left ventricle. On the other hand, there is the danger of venous stasis and insufficient blood supply to the organs generally. The heart itself may suffer through deficient supply from the coronary vessels. It is marvellous how nature manages to control the balance between the output of the ventricle on the one hand, and the ever-present danger of stasis on the other. Yet, when the failure in the fine balance does appear, that failure is great and grave. When the pressure is in the normal region; a sudden and decided drop is of evil prognostic significance. The circulation will fail against too small, as well as against too great, a resistance. It is here that the vasomotor system plays such an important part. Probably few things are more serious than a paresis of this system. The vessels lose tone, blood collects in the splanchnic region, the great arterial aid in carrying on an adequate circulation is diminished, and the heart in its endeavour to cope with this must beat ever faster and faster. And as the faster beat is at the expense of the diastole of the "sleep" or rest of the heart, a vicious circle is produced.

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healthy and physically flourishing appearance. Yet for some years the heart, now somewhat enlarged and, consequently, its total reserve diminished, has been labouring against an increased arteriolar resistance. Allbutt⁹ protests against "the accusation of these striving hearts of complicity in the arterial disease . . . They are stout and faithful to the end, even in defeat." However true this may be in a general way, these hearts do not stand the strain of pneumonia well. Three, four, five, or six days, and the end comes with startling suddenness.

These patients cyanose very easily, and do not readily tolerate the effects of toxæmia; undue breathlessness is only too easily excited. A great part of the cardiac reserve has been used up in overcoming the resistance, to which for long it has been subjected. These hearts can, therefore, be called upon less than a normal previously unstrained heart.

One of the great dangers in pneumonia is a sudden drop in the blood-pressure. When the pressure is excessively high, and the patient could get on more comfortably and better with a lower pressure, a drop may then do good, in so far that it may relieve the strain on the left ventricle. On the other hand, there is the danger of venous stasis and insufficient blood supply to the organs generally. The heart itself may suffer through deficient supply from the coronary vessels. It is marvellous how nature manages to control the balance between the output of the ventricle on the one hand, and the ever-present danger of stasis on the other. Yet, when the failure in the fine balance does appear, that failure is great and grave. When the pressure is in the normal region, a sudden and decided drop is of evil prognostic significance. The circulation will fail against too small, as well as against too great, a resistance. It is here that the vasomotor system plays such an important part. Probably few things are more serious than a paresis of this system. The vessels lose tone, blood collects in the splanchnic region, the great arterial aid in carrying on an adequate circulation is diminished, and the heart in its endeavour to cope with this must beat ever faster and faster. And as the faster beat is at the expense of the diastole of the "sleep" or rest of the heart, a vicious circle is produced.

Hence the danger of a sudden drop in pressure. It means

insufficient cardiac rest, insufficient cardiac nourishment, diminution in the renal and in the basal pulmonary circulation and, if unsuccessfully combated, a fatal termination. Symptoms comparable to shock appear, and adrenalin, pituitrin, and saline infusions are often of most service.

This sudden drop in pressure, with its consequent train of symptoms, is of real and of grave significance. It sometimes appears at or just after the crisis, and there is no time to be lost in adopting treatment if the life is to be saved. Hence the importance of keeping an eye on the blood-pressure right through every case. If, when the collapse comes, this has not been done throughout, it is more guesswork than certainty if one alights on the true cause. Where one can feel tolerably sure that a drop in pressure is simply a drop and unassociated with vasomotor paralysis, a few doses of strychnine may be of service, for the drug seems to possess the power, in selected cases, of helping to raise the pressure.

THE DRUG TREATMENT OF PNEUMONIA.

Various preparations have already been mentioned; and many drugs have been vaunted as specifics. Quinine is probably one of the most useful. I have thought that I have had very good results from its routine use. Frequent small doses are, I believe, best—2 to 4 grains every four hours. I think there is good reason to believe that this drug favourably influences the course of the disease.

Sterules of camphor in ether are useful, if a rapid stimulant is required. Two should be injected subcutaneously. Alcohol may be very useful for tiding over critical periods; its routine use in every case is greatly to be deprecated. Probably where its employment is essential, is in the case of those who have been accustomed to drink fairly freely. The sudden abstinence from alcohol may here cause considerable collapse, and may favour the rapid production of active delirium.

The routine use of calcium salts seems a rational proceeding, in view of their favourable action on the heart; on the other hand, too great an increase in the coagulability of the blood, theoretically, does not seem desirable.

Phylacogen therapy and the use of vaccines are both deserving of further use. Of the former, I have had no

experience, but the results published seem to warrant thorough trial.

THE PULSE IN PNEUMONIA.

There is no factor more important in determining the general condition and safety of the patient than the state of the pulse. My own experience has been that, however unfavourable many of the other signs may be, a really good pulse is more to be depended upon than anything else. By a good pulse, it is meant to convey the idea of a pulse of only moderate rapidity, of good volume, regular, and without evidence of diastolic pulsation. A diastolic pulse can readily be distinguished from alternation of the pulse; in the former, there are two beats in every one of the ventricle. A persistently rapid pulse is a danger sign, and calls for early attention to the heart; irregularity generally points to cardiac exhaustion, and a thready pulse is ever an anxiety. The collapsible pulse, the pulse of unfilled arteries, is of bad prognostic significance. The slower the pulse is, the less is the likelihood of cardiac exhaustion setting in.

SOME PROGNOSTIC SIGNS.

In spite of several prognostic signs, usually considered bad, being present, I venture to say that most cases will come through successfully, if the heart can be kept right. One has seen cases with many bad signs—dry, furred tongue, prune-juice sputum, marked cyanosis, and active delirium—come through well, and, one might say, almost easily; but in such cases the circulation and heart have generally remained good throughout.

Persistent insomnia is of serious omen, cardiac exhaustion being almost certain to ensue.

Irregularity of the pulse, especially after the sixth day, is not generally of favourable prognostic import.

In the cases I have seen, prune-juice expectoration has been of bad omen. This seems to appear mostly in the very toxic cases; the altered blood seems to point to toxæmic changes, and, possibly, to deficient aëration. I have often noticed that it frequently goes along with pronounced cyanosis.

The second pulmonary sound is of great prognostic

insufficient cardiac rest, insufficient cardiac nourishment, diminution in the renal and in the basal pulmonary circulation and, if unsuccessfully combated, a fatal termination. Symptoms comparable to shock appear, and adrenalin, pituitrin, and saline infusions are often of most service.

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SYPHILIS *

By G. C. FRANKLIN, F.R.C.S., LL.D.

Consulting Surgeon, Leicester Royal Infirmary; Lt.-Col. R.A.M.C. (T.), etc.

THE subject of syphilis is so immense, so important, and so interesting, that if only a few points are considered, I do not think the time is wasted. In great measure my remarks will be retrospective. . . . Montaigne, in one of his essays, says:—

“The future cannot be forecast intelligently, or with any probability without reference to the past, without a true knowledge of what has been already done—at the same time, dwelling too exclusively on acquisitions already made is unfavourable to progress, is virtually obstruction. Individual experience lies at the foundation of the habit which is so much more marked in some minds than in others—the habit of reflexion—of retrospect. In general, it may be said, the wider the knowledge, the more extended the experience, and the more generous the nature, the more marked will be the tendency to dwell on the history of past work and workers. The men who have done most are the men who dwell most fondly on the achievements of others in the past—their own success in the overcoming of difficulties gives them a generous interest in what others did before them—the other men laboured, they have entered into their labours.”

Some 20 years, ago I read a paper “Some Notes on Syphilis,” at a Branch Meeting at Leicester, relating my experiences extending over a period of just 25 years. I have those notes now, and they form, as it were, the “Text” for what I am about to say.

This generation of medical men has never seen, I

* Address at Southern Branch Meeting of B.M.A.

significance. Maintenance of the intensity of this is of favourable import; gradual diminution is evidence of failure. This is a sign that will rarely be found to fail.

Weakening of the first sound in the mitral area is evidence of general cardiac asthenia. Care must be taken to distinguish between a weakening and softening of the first sound, and a sound muffled, and apparently weak, through an emphysematous lung.

Gallop rhythm, the tick-tack heart, and bad spacing of the sounds are also unfavourable.

In my series, I have not found that the combination of a high temperature, active delirium, dry furred tongue, and quick respiration is anything so formidable as the appearance of any cardiac insufficiency. I remember a case presenting all the general severe signs, with great intensity, but with no evident cardiac embarrassment. On the eighth evening he became maniacal, and so great was the disturbance he created, that in the middle of the night he had to be removed from the general ward he was in. It took four attendants to move him, and he fought like a tiger. Some eight hours later the crisis occurred, and the pulse dropped into the seventies.

Œdema of the lungs is of grave import; in pneumonia, or, in other states, it is sure evidence of some degree of cardiac failure—generally a failing ventricle. When œdema exists, evidence of alternation of the pulse should be looked for.

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- ⁵ Sir Launder Brunton: *Therapeutics of the Circulation*.
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- ⁷ *Ibid.*
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- ⁹ Quoted by Langdon Brown, *Ibid.*



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suppose, the severe cases—those that were written about early in the last century. In Miller's *Surgery*, which was widely read in the sixties, Cooper is quoted. He says:—

“Most of the young creatures who are brought from that genteel place ‘Swan Alley,’ afflicted with phagedenic ulceration, have had very little wholesome food; they are generally kept by Jews and Jewesses, who give them plenty of gin though but little proper nourishment; they are half starved, and, more or less in a continued state of excitement and intoxication, having connection with Lascars and other dirty foreign seamen, as many times in the day as there are hours. We cannot wonder that their impaired and imperfectly developed frames, their course of life, and uncleanness, should promote phagedenic ulceration, and give it an unusually severe character.”

I well remember seeing on board the old Hospital Ship *Dreadnought*, when she lay in the Thames, some three or four cases of phagedenic sloughing sore in ill-nourished sailors—men who had contracted the disease just before sailing, and who, therefore, had probably had no opportunities for treatment. This was in 1869, but I have never seen any such cases since.

During the period from 1875 to 1900, I kept a great many notes of cases of syphilis. I was so astonished at the ravages caused by it, that I was induced to put on record those cases, in private, not hospital practice, which I was able to follow. I have selected 10 of these, and propose to refer in each—

- i. To the effect on the patient himself.
- ii. To the effect on his wife, if married, and
- iii. To the effect on his children, if he had any.

No. 1.—Man, æt. 20, contracted syphilis when a student at hospital. Married 10 years afterwards, having had no evidence of disease for four or five years, except throat in the winter. No children. He developed visceral disease at 45, and died a complete wreck.

No. 2.—Man, æt. 20, contracted a sore, previous very healthy and athletic; he married ten years afterwards (two children), elder one “puny,” the younger subject to eczema for the first two years of his life, wife in good health. This patient developed a sore on his leg within two or three years of his primary sore. This “patch

of eczema," which he called it, troubled him on and off for 20 years. His two children have lived to grow up, and were both passed into the Army two years ago.

No. 3.—A man, æt. 25, of previous good health, contracted syphilis; married four years subsequently, being apparently in robust health. Five years afterwards, *i.e.*, nine years after the infection, he developed "General paralysis of the insane," and lived the usual two years or so. The wife was quite healthy, and there were no children. He had had a distinguished career at Cambridge, but was never robust.

No. 4.—A man, æt. 25, became syphilized. He had never been strong, and two brothers had died from phthisis. It was a very long and sad case, mostly throat trouble. About 20 years from the date of the initial sore he developed nerve symptoms, became very irritable with head pains, but showed no evidence of any paralysis, or of affections of the organs of special sense. Eventually he became melancholic, and died from his own act. Two years previously he told me that he attributed all his troubles to the syphilitic sore of 20 years ago. He was unmarried.

Nos. 5 and 6.—Same history, both contracted syphilis when under 30. No. 5 died in 15 years from visceral disease. No. 6 lived for 17 years; had a sore on his leg, which was never healed, and suffered from alopecia. Pneumonia was the immediate cause of death. Neither of these patients was married.

No. 7.—Seen first when his second wife was confined. He had contracted syphilis during his early married life. The first wife died, quite young, leaving two children. In the second family, the poison showed itself; the first child died at two, covered with eczema, then twins, who died within six months, and a boy who lived to be 10 or 11, but lost the sight of both eyes $1\frac{1}{2}$ years before he died from meningitis. Ten years after this second marriage, the wife developed an abdominal tumour. A distinguished London consultant would not commit himself to a diagnosis; it was probably spleen, and after reaching a certain size, remained in that condition for some years. Eventually, the father became alcoholic and hopelessly imbecile.

No. 8.—Contracted syphilis when under 30; allowed to marry four years afterwards. Two puny syphilitic children, who weathered the storm, and have reached adult life. The mother suffered from psoriasis—both hands—for years. This patient passed diabetic urine for some eight years or so before his death. Whether this had anything to do with the syphilis, I cannot say.

No. 9.—Æt. 25, a fine man when he contracted syphilis. Was to wait two years or three before marrying. He married just two years after the disappearance of a secondary rash. It was a sad business. The wife soon had a mysterious illness away from home. No child. The patient became alcoholic, and found his way to a mental hospital.

No. 10.—Man, aged 40, married; two children, and previously healthy. He infected his wife, and both were under treatment at

the same time. Husband had psoriasis and ulcerated throat. Wife also had a bad throat. She thought it very strange that her illness should be so like her husband's, but she had always understood that "throats were catching." No family subsequently.

Now, of these 10 men, all of whom I saw throughout, seven were married; one had married twice and infected both his wives. Three had no children, four had children; three had two only, and the other one seven or eight, three of whom lived to adult life. Of the seven wives, all were living at the end of the 25 years, about 1900; four had distinct evidence of infection, shown by psoriasis, mostly, and sterility.

Of the syphilitic husbands, during the same period, two died, two are living but insane, one living and diabetic, and two were "cured."

Of the three unmarried men, all died under 50, one by suicide, and two from acute visceral disease. Out of the 10 cases, therefore, five died in this period, not one of them reaching 50 years, and five were living, two only of them being in good health, one being diabetic, and two insane.

In other words, of the 10 men who had contracted syphilis, some 25 or 30 years previously, only two were in health sufficiently good to enjoy life.

If this be the experience of only one man in general practice in a large manufacturing centre, it is appalling to think what the ravages of syphilis amount to.

I have no time to dwell on the treatment. It was the "treatment" of 30 years ago, and in cases many times most disappointing. I gratefully remember the help I had, not infrequently, from Sir (then Mr.) Jonathan Hutchinson.

During the last few years, it seems to me that with the great advance in all research work the treatment of syphilis has been, or, is being, quite transformed. In respect, for instance, of nerve lesions in early middle life, many are now known to be of syphilitic origin; what were mere conjectures by earlier observers, such as Bristow of St. Thomas's and Sutton of the London have now become certainties. I would venture to ask those now in active practice whether there is the marked improvement following the new treatment that was expected. I am not competent to give any opinion from experience. I know only what I read. That there has been a steady improve-

ment during the last half century I think there can be no doubt, but we want good, reliable evidence whether we are on the right lines to reduce the effects of the poison materially—or even, in the words of enthusiasts, “stamp it out altogether.”

What can be more important. The happiness of numbers of people depends on whether the very best is being done that can be.

This brings me to another point. From reading the daily papers, now-a-days it seems that we are not obliged to speak with “reserve of the private parts.” Celsus says “that in his day both physicians and patients spoke only with reserve of the private parts. It is not, therefore, an easy thing for one who wishes to observe the rules of propriety, without departing from those of art, to treat of these diseases.”

To deal with the history of syphilis now, is impossible, but it seems clear that Celsus knew the difference between what is called the hard and the soft chancre in the present day, for he says: “In phymosis—after having overcome the resistance of the prepuce, there are seen, when it is drawn back, ulcers situated either on its inner surface, or on the glans, or on the penis beyond the glans; these ulcers are either clean or dry—or moist and purulent.” Later, he tells of secondary affections, and Aretæus, writes that in some persons “the uvula is destroyed to the bones of the palate, and the fauces to the root of the tongue and epiglottis.” So primary local lesions and secondary affections appear to have been observed from the earliest periods of Latin medical science.

Of the great epidemic of syphilis in Italy in the 15th century, we make a note, inasmuch as mercury was first used then—introduced from Arabia—and at first only used externally. The use and abuse of mercury, in the treatment of syphilis, for 400 years or so, should be a subject of profound interest—never of greater interest than it is to-day.

I venture to say, therefore, that we may safely conclude—

- (i) that the severity of the syphilitic poison in the present day is not so manifest as it was 50 years ago, and certainly not as it was 100 years ago;
- (ii) that the treatment during this period, medically—

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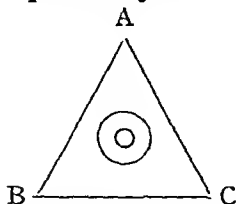
HÆMATOMA OF THE UMBILICAL CORD AT CHILDBIRTH, WITH SEVERE
HÆMORRHAGE FOLLOWING DOUBLE LIGATURE OF THE CORD.

By PERCY R. COOPER, M.D., B.Sc., F.R.C.S.

THIS case, which recently occurred in my practice, presents one or two points of more than passing interest.

The birth was a fairly normal one, requiring no artificial aid, and the child was a vigorous full-time male. It was at once noticed that the cord, for a distance of about four inches from the child's navel, was greatly thickened and of blackish appearance—evidently the seat of a hæmatoma. The covering of this "sausage-like" portion was extremely thin and friable looking, and, as I fully anticipated, even a broad ligature at once tore through and caused free bleeding. A second ligature was applied as close to the abdominal wall as possible, but, again, free bleeding occurred from the stump. As there was now practically no umbilical cord left to ligature, I at once decided to pass a subcutaneous catgut ligature round the root of the umbilical cord, *i.e.*, at the navel, and so secure the umbilical vessels immediately before their entry into the cord.

I sterilized the skin with 1 in 1,000 Hydrarg. Biniol. solution, and boiled an ordinary straight surgical needle with a sufficiently large eye to carry a fairly stout iodized catgut ligature. The passing of the ligature can best be explained by the use of a diagram. The needle was entered



at A, and brought out at B, leaving a long end projecting from A. The needle was re-entered exactly at B, traversed line B—C, and was drawn out at C. Finally, it was entered again at C, traversed line C—A, and the travelling end of the ligature appeared at A, where it was firmly knotted to the long end which had been left there for the purpose at A. In this way the root of the cord was completely encircled by a ligature, subcutaneous everywhere, except at A—the knot. In carrying out this

or medicinally, throughout the country has much improved, due, in great measure, to the wonderful advance of bacteriological knowledge.

Surely we can congratulate ourselves that the State has recognized the immense importance of the subject of venereal diseases. We do not know what conditions the State may suggest or impose, but on one or two points the profession, as a united whole, must speak with no uncertain voice. . . . Quack practice and treatment by unqualified people should be made illegal absolutely. Again, any idea of compulsory notification should be at once cast aside as impracticable, and, I think, impossible. It was grievous to see in a statement or "manifesto" in the newspapers, quite recently, signed by good meaning people, the suggestion that "immediate and compulsory notification" should be enforced. I wish that they knew what Celsus said, and that they would read the oath of Hippocrates. In that, it may be remembered, he says: "Whatever, in connection with my professional practice, or not in connection with it, I see, or hear, in the life of men, which ought not to be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret."

The proposition of "free centres or clinics" for treatment is all to the good, but I hope that it will be arranged that practitioners in turn, in their respective neighbourhoods, will attend them, and be paid, and that we shall not have a set or body of all-time men for the work.

Finally, I would suggest that all our papers—discussions and retrospects—especially, perhaps, in this matter of syphilis and venereal diseases, are comparatively useless unless we get at the truth—absolute truth. That is our chief weapon with which to attack the chicanery and humbug of the present day.

Syphilis is a disease which we are all called upon to treat, whether specialists or general practitioners, and the more there is known about it, and the better it is treated, so much the better will it be for the Profession, so much the happier will it be for hundreds of our fellow creatures, and, inasmuch as a healthy nation is a powerful nation, so much the more secure and more safe will be the condition of our immense and widely extended Empire.

CASE WITH COMMENTS:

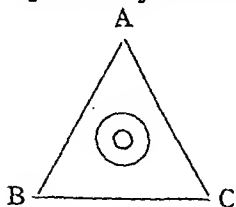
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plan, care must be taken that the needle is passed close under the skin, so as to run no risk of damaging any deeper structures, and not to transfix the umbilical vessels themselves so as to cause subcutaneous hæmorrhage. The presence of a congenital umbilical hernia must also be excluded, and the rare occurrence of a Meckel's diverticulum extending along the cord (I have had at least one such case) should be borne in mind.

In this particular case, the hæmorrhage was promptly and permanently controlled, and the navel healed with remarkable rapidity. To-day, some six weeks later, the navel is firm and healthy, in striking contrast to those of other infants who have been treated in the usual way, and in whom umbilical herniæ are so frequent; two out of my previous three "normal" cases have had to be provided with umbilical trusses. One is emboldened, therefore, to suggest that this method might prove in some measure a preventive of umbilical hernia.

So far as I know, this method of arresting hæmorrhage from the umbilicus is original; I have never seen it described before, and can find no mention of it in the text-books. It was devised on the spot to meet the emergency, for the child would certainly have bled to death if left alone. The immediate and complete success of the procedure must be my excuse for publishing a single case, for evidently these cases are somewhat rare, and if I waited for others it might never have been published at all. I believe the method is absolutely safe and reliable, if the precautions I have named above are observed. No child ought to be allowed to die of umbilical hæmorrhage.

As regards the cause of the hæmatoma, one can only suggest that the umbilical veins had become dilated and varicose, and during birth the tension on the thinned and distended veins had caused their rupture; the separation and attenuation of the tissue of the cord by the distending blood clot had made this tissue so friable that it would not stand a ligature. Had one left the large length of cord, with its contained hæmatoma, attached to the child's abdomen, the risks of sepsis and pyæmia from extension of infection along the umbilical veins would, I fear, have been considerable.

ENTERO-SPASM FOLLOWING SHELL SHOCK.

By P. C. COLLINGWOOD FENWICK, L.M.S.S.A.

House Physician to the Royal Sussex County Hospital, Brighton.

DURING last year, two soldiers were admitted to the military wards of the Royal Sussex County Hospital, having been sent from France suffering with shell shock.

The one was aged 20 and the other 18, and both had recently been in action at the front. They complained of severe headaches, and restless nights, during which they had had disturbing dreams. The elder of the two had been in the trenches off and on for over a year, was now a sergeant, and held a certificate of merit for conspicuous gallantry under heavy fire. He was blown up, and he remembered nothing more until he found himself in hospital some days later, suffering from severe headache and twitching of legs and arms. For the next three and a half months, he suffered with constipation to such a degree that during that whole period of time his bowels were never opened except by enema, although amongst the various drugs he was given were colocynth, hyoscyamus, calomel grains, 3; castor oil, 1 oz.; liquid paraffin, $\frac{1}{2}$ oz., t.d.s.; liquid ext. cas. sag., and pulv. scammonia co. He had massage and electric battery to his abdominal wall, but these only tended to increase the pain, which was severe at times.

The second case, during the last three days he was in action suffered with acute diarrhoea and abdominal pain. He was sent home with shell shock and enteritis, but after admission to this hospital he had very marked constipation, which was not relieved by any laxatives or purgatives. For many weeks his bowels were not opened except by enema, and during that time he had attacks of very severe abdominal pain, which appeared almost like renal colic, and was not relieved by large doses of opium and morphia. During one of these severe spasms of pain which were always in the left side of the abdomen, he was given inhalations of chloroform which immediately gave relief.

For over two months these cases remained in the same condition, and no treatment seemed to have the slightest effect on the intestinal stasis. It was then decided to give small doses of belladonna, and 7 minims of the tincture were given, three times a day, to each patient. In each case after 48 hours, following considerable abdominal pain, the bowels were opened, and they have remained quite regular ever since. Each day the pain before and during a motion became less, until now there is practically no inconvenience at stool. Both men have greatly improved in health, sleep better, and are seldom troubled with headache. The condition of the bowels seems to have been one of entero-spasm which was broken down by belladonna in comparatively small doses.

For permission to report on these cases, I am indebted to Lieut.-Col. E. Hobhouse and Major W. Broadbent, Hon. Physicians to this hospital.

plan, care must be taken that the needle is passed close under the skin, so as to run no risk of damaging any deeper structures, and not to transfix the umbilical vessels themselves so as to cause subcutaneous hæmorrhage. The presence of a congenital umbilical hernia must also be excluded, and the rare occurrence of a Meckel's diverticulum extending along the cord (I have had at least one such case) should be borne in mind.

In this particular case, the hæmorrhage was promptly and permanently controlled, and the navel healed with remarkable rapidity. To-day, some six weeks later, the navel is firm and healthy, in striking contrast to those of other infants who have been treated in the usual way, and in whom umbilical herniæ are so frequent; two out of my previous three "normal" cases have had to be provided with umbilical trusses. One is emboldened, therefore, to suggest that this method might prove in some measure a preventive of umbilical hernia.

So far as I know, this method of arresting hæmorrhage from the umbilicus is original; I have never seen it described before, and can find no mention of it in the text-books. It was devised on the spot to meet the emergency, for the child would certainly have bled to death if left alone. The immediate and complete success of the procedure must be my excuse for publishing a single case, for evidently these cases are somewhat rare, and if I waited for others it might never have been published at all. I believe the method is absolutely safe and reliable, if the precautions I have named above are observed. No child ought to be allowed to die of umbilical hæmorrhage.

As regards the cause of the hæmatoma, one can only suggest that the umbilical veins had become dilated and varicose, and during birth the tension on the thinned and distended veins had caused their rupture; the separation and attenuation of the tissue of the cord by the distending blood clot had made this tissue so friable that it would not stand a ligature. Had one left the large length of cord, with its contained hæmatoma, attached to the child's abdomen, the risks of sepsis and pyæmia from extension of infection along the umbilical veins would, I fear, have been considerable.

After the swabbing, powders or ointments should be applied, or ointment followed by powder.

Powders may be simply of starch or lycopodium, or to either may be added camphor, guaiacol, menthol, or salicylic acid (from 1 to 3 per cent.). Either of the following will be found useful:—

R Acidi salicylici - - - - gr. xv.-vxliv.
 Talci.
 Zinci oxidi.
 Bismuthi carbonatis - - - ana ʒiiss.
 Amyli - - - - ʒiiss.
 Misce. Fiat pulvis.

or,

R Camphoræ.
 Mentholis - - - - ana gr. xv.-xliv.
 Zinci oxidi.
 Talci - - - - ana ʒiiss.
 Amyli - - - - ʒij.
 Misce. Fiat pulvis.

Pastes and Ointments may consist of cold cream, ceratum, zinc ointment, glycerole of starch, fresh lard, cod-liver oil or carron oil, all of which are of service. They may be thickened with oxide of zinc, kaolin, and talc, in equal parts or two to one, to form an inert paste. Menthol (1 to 2 per cent.), camphor (1 to 2 per cent.), guaiacol (1 to 3 per cent.), salicylic or carbolic acid (1 to 2 per cent.), or tartaric acid (3 per cent.), may be added to any of these.

Cocaine and other analgesics can be used for localized patches of pruritus:—

R Cocainæ - - - - gr. xv.
 Zinci oxidi.
 Talci.
 Amyli.
 Alcoholis.
 Glycerini.
 Aquæ - - - - ana ʒiiss.
 Misce. Fiat pulvis.

Two thick layers of this are spread over the affected area each day, morning and evening. Starch or one of the above powders is then dusted on well, and the application covered with thin gauze.

Occlusives should be used when any of the preceding methods have failed, or from the outset in the case of severe and obstinate pruritus. Gougerot advises the use of plasters, varnishes, or films in the case of localized pruritus, and of pastes in the case of lichenous patches of old standing.

The plasters are applied plain or with some anti-pruriginous substance added: cod-liver oil plaster with or without carbolic acid and naphthol; resorcin or salicylic acid plaster. These are left in place for twenty-four or forty-four hours, a careful watch being kept

Practical Notes.

LOCAL TREATMENT OF PRURIGINOUS DERMATOSES.

Gougerot has recently published a collection of several methods of treatment for these skin affections, which are often very troublesome to deal with and occasion much distress, from which the patient begs for relief.

Baths should be very hot or cold, and may contain bran, starch, tilia, camomile, gelatine (250 g.), cod-liver oil, or vinegar (1 litre). The water should be at a temperature of about 95° F., and the patient should remain in the bath for from fifteen to twenty minutes. On getting out of the bath, the skin should be dried gently without rubbing. If the bath appears to increase the itching, it must be stopped.

Lotions should be used very hot or cold, and applied morning and evening, as well as when the itching becomes intense. They may consist of vinegar (30 per cent. in water), carbolic acid (1 per cent.), salicylic acid ($\frac{1}{4}$ to 1 g. per litre), coal-tar *saponin* (5 to 25 per litre), sublimate (1 per cent.), resorcin (1 to 2 per cent.), poppy-heads (3 to a litre), coca leaves, or two table-spoonfuls of the following in a tumblerful of very hot water:—

R.	Acidi carbolici	-	-	-	-	gr. vx.
	Chloralis hydratis	-	-	-	-	$\frac{3}{4}$ ss.
	Glycerini	-	-	-	-	$\frac{3}{4}$ iss.
	Aceti aromatici	-	-	-	-	$\frac{3}{4}$ vj.
	Misce.					Fiat lotio.

To the most irritable areas may be applied for the night compresses of one of the lotions mentioned, or of a solution of two tea-spoonfuls of powdered guaiacyl in 50 cc. of cold water. This application must be covered with some impermeable material, and kept in place by a loosely-applied bandage.

Swabbing, in the case of localized, moist, and fissured areas, should be carried out twice a week with an aqueous solution of nitrate of silver (10 per cent.); in more extensively affected patches an oily solution of menthol (2 per cent.), gomenol (10 per cent.), camphorated alcohol, or of resorcin (from 2 to 5 per cent.). The following is frequently useful:—

R.	Cocainæ hydrochloridi.					
	Chloralis hydratis.					
	Resorcini	-	-	-	ana	gr. xv.
	Glycerini	-	-	-	-	$\frac{3}{4}$ ss.
	Alcoholis	-	-	-	-	$\frac{3}{4}$ j.
	Aq.	-	-	-	ad	$\frac{3}{4}$ iv.
	Misce.					Fiat lotio.

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R	Acidi salicylici	-	-	-	-	gr. xv.-xxlv.
	Talci.					
	Zinci oxidi.					
	Bismuthi carbonatis	-	-	-	ana	℥iiss.
	Amyli	-	-	-	-	℥ij.
	Misce.	Fiat pulvis.				

or,

R	Camphoræ.					
	Mentholis	-	-	-	-	ana gr. xv.-xlv.
	Zinci oxidi.					
	Talci	-	-	-	-	ana ℥iiss.
	Amyli	-	-	-	-	℥ij.
	Misce.	Fiat pulvis.				

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	Amyli.					
	Alcoholis.					
	Glycerini.					
	Aquæ	-	-	-	-	ana ℥iiss.
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for any sign of irritation. The following are also of use:—

R	Zinci oxidi	-	-	-	-	-	3iiss.
	Gelatini.						
	Glycerini.						
	Aquæ	-	-	-	-	-	ana 3j.
	Spiritus Menthæ piperitæ	-	-	-	-	-	q.s.

A better preparation is the paste of the Hôpital Saint-Louis, which is prepared in the following way, according to the prescription of Portes: 150 g. of ordinary gelatine and 100 g. of pure gelatine are slowly dissolved in 300 g. of boiling water. Another mixture is prepared containing 5 g. of gum arabic, 300 g. of glycerine, and 100 g. of zinc oxide. The first mixture is filtered through linen and mixed with the second, which must be kept well stirred during the addition. Finally, 2 g. of phenolsalyl and sufficient spirits of peppermint are added. The mixture is then poured into a porcelain jar and kept covered up. Camphor, menthol, guaiacol, etc., may be added to this. For use, the paste is softened in a *bain-marie*, one hour at least being necessary. The jar is left in hot water, and the liquid paste, when not too hot, is painted over the affected area with a large brush, several layers being applied. The surface is then "whipped" with flakes of absorbent wool, which promotes the setting of the gelatine. Glazing is complete in from 15 to 20 minutes. At the end of a week, the layer is removed by means of hot water, and a fresh coat is applied.

Spraying will relieve relapsing and passing attacks of pruritus, such as urticaria. Gaucher recommends:—

R	Mentholis	-	-	-	-	-	3ijss.
	Spiritus camphoræ.						
	Ætheris.						
	Chloroformi	-	-	-	-	-	ana 3i.

Sicard recommends subcutaneous injections of air to ease painful and localized patches of pruritus.—(*Journ. des Praticiens*, December 16, 1916.)

TREATMENT OF VINCENT'S ANGINA.

Félix Raymond points out that, for several months, the number of cases of Vincent's angina has been on the increase with a corresponding falling off in the numbers of cases of other sore throats, especially those due to diphtheria. He considers that the cause of this is to be found in the fact that the soldiers have great difficulty in carrying out the customary methods of hygienic care of the mouth. This appears to be confirmed by the frequent co-existence of ulcero-membranous stomatitis, the bacteriological pathogeny of which is to all intents and purposes the same. These two diseases are often observed co-existing, but, since the dental centres have been brought into good working order, ulcero-membranous stomatitis has tended to get less frequent, but is replaced by Vincent's angina.

Seeing that the nature of these inflammatory lesions is identical, the treatment ought to be the same. Three methods of treatment are chiefly in use: that by methylene-blue suggested by A. Chauffard, that by a 2 per cent. solution of nitrate of silver practised by Félix Raymond, and Achard's use of arseno-benzol or neo-arseno-benzol. Of these, the last gives the best results. Recovery, however, is always a somewhat lengthy affair to bring about; moreover, arseno-benzol is rather a costly drug, especially at the present time, and it is, therefore, essential to find a method which shall be less expensive and, at the same time, quite as efficacious. Raymond has been using his method for some months, and is fully satisfied with his results.

In *Vincent's angina*, the ulceration is cleaned up thoroughly by mechanical means until all membranous detritus has been removed, leaving the throat clean. The affected surface is then treated with a swab soaked in a 2 per cent. solution of nitrate of silver. The patient beforehand uses a gargle consisting of a 1 per cent. solution of cocaine. This produces a relative anæsthesia of the faucial mucous membrane in about five minutes. The jaws are propped open, and the head thrown backwards and kept firmly in place by an assistant. By means of a small curette with blunt edges, the base and borders of the ulcer are quickly scraped until all bloody detritus has been cleared away. Slight hæmorrhage is produced, but this is quickly checked by a gargling with hydrogen peroxide lotion. The irregular surface is then dried with pledgets of absorbent wool, and immediately afterwards touched with a swab soaked in the solution of silver nitrate. The operation is not very painful, and the bleeding is always very slight. The blunt edges of the curette prevent any injury being caused to the deep tissues. There are no serious complications to fear. Raymond's experience with the procedure has shown that there is no risk of a general infection arising from it. The operation must be repeated every day for two or three days. Healthy granulations soon make their appearance, and healing is only a matter of a few days.

In *ulcero-membranous stomatitis*, the procedure is on the same lines: preliminary anæsthesia with cocaine, and instrumental cleaning of the ulcer. If the ulceration affects the gums, localized specially round the neck of a tooth or about a stump, the curette is of no use. Raymond, in such cases, makes use of a stiff-bristled tooth-brush, which cleans up the ulcers very thoroughly. The subsequent bleeding is always very slight, and is stopped by washing out the mouth with oxygen water. The mucous membrane is quickly dried, and then swabbed with the solution of nitrate of silver. This must be repeated for three or four days, and healing takes place very quickly. Raymond uses this method of treatment in all cases of sore throat with good results.—(*Le Progrès Médical*, December 20, 1916.)

Reviews of Books.

Operative Gynæcology. By HARRY STURGEON CROSSEN, M.D. Pp. 670, with 770 original illustrations. London: H. Kimpton. 31s. 6d. net.

IN this book, the technique of the various operations, the difficulties likely to be encountered, the indications for operation, and the selection of the exact form of operative procedure best suited to the particular case, are described and discussed. The words written by Dr. Crossen in his preface are well worth repeating here. He says "The patient is given the best service only when the operator, familiar with the pathology of the pelvis, and with the various operative procedures available, makes a careful study of the conditions present in the individual case, and selects the operation most suitable for that particular combination of pathological changes."

Retrodisplacement of the uterus is considered in the first chapter, and we are told that "The operative measures for holding the uterus forward are very numerous, the number running well above a hundred"! The most useful methods are described and admirably illustrated, and the author finally gives what he considers to be the indications for employing the different methods. The surgical treatment of uterine prolapse is described, and the steps of the different operations are depicted with great clearness. One of the best chapters in the book is on fibromyoma of the uterus, and here, besides describing the different operations which may be required, a useful guidance is given as to when hysterectomy is required, and whether the cervix should be removed or retained.

The author's opinions on the treatment of fibromyomata are characterized by a judicial sense of proportion, which is too often absent in many special publications. We note, too, a guarded opinion is given concerning the alleged benefits of Radium *v.* X-rays.

There is a good description of the abdominal radical operation for uterine cancer, the steps of which are admirably illustrated. The radical vaginal operation is also given due prominence, in an equally well illustrated article. We fully agree with Dr. Crossen when he warns against subjecting women with advanced uterine cancer, involving the bladder or rectum (unless distinctly localized) to the suffering and disappointment of an attempted radical operation without any reasonable hope of cure.

The general standard of excellence is maintained throughout the remaining chapters of the book, which concludes with one on "Medico-legal points," under the following headings: 1. Consent to operation. 2. Foreign bodies left in the abdomen. 3. Persistence of symptoms after operation. The author advises that consent be obtained in writing for the "performance of the required operation,

a very clear but not too lengthy account of embryology, and is divided into two sections: general embryology, which includes the germinal elements, impregnation, formation of the germinal area, formation of the embryo and of the foetal membranes and placenta; and organogeny, in which the formation of the various "systems" of the body is dealt with. Throughout the book, wherever necessary, reference is made to comparative embryology, and the subject is thereby made much clearer. We should have liked to have seen a fuller account of the development of the blood and leucocytes, which are hardly touched on in the volume. The book is profusely illustrated with 304 figures in the text; these are very clear and distinct, and in some cases coloured. This manual fills a distinct gap in medical literature, and should be widely read.

Major E. G. Ffrench, R.A.M.C., writes:—

"In my article on 'The Treatment of Venereal Diseases in the Army,' in the third War number of THE PRACTITIONER (May, 1916), I mentioned that some pain was caused at first in treating acute gonorrhoea by the electrolysis method of Dr. Charles Russ, but I am glad to know from Dr. Russ that had carbolic oil been used as a lubricant no pain would have resulted. Cocaine is not necessary if carbolic oil is used."

Dr. Fred J. Smith, of 138, Harley Street, W., writes:—

"I wish to establish, if possible, as a fact whether there is or is not a case of a 'woman, aged 48 or over, having had a living or viable child,' recorded on evidence other than the mere *ipse dixit* of the woman as to her age. Might I enlist the assistance of your readers to enable me to settle the point by reporting to me any cases within their knowledge?

"I am, of course, aware that there are a good many reported on the evidence of the mere statement of the woman that she was 48 or older; but as the Registration of Births Act is now over 50 years old, it should be possible to get the date of parturition and the date of the mother's birth both officially recorded, and it is cases of this nature I am anxious to obtain for a forthcoming edition of Taylor's *Medical Jurisprudence*."

Preparations, Inventions, etc.

AMBRINE.

(London: The Anglo-French Drug Co., Ltd., Gamage Buildings, Holborn, E.C.)

This preparation, which was described in a recent number of *THE PRACTITIONER* (January, 1917), has now been brought on the market, and is obtainable in this country. It has established a good reputation in France both for the results accruing from its use, and its ease and readiness in application. It is recommended for use in open wounds of all sorts, particularly in those arising from burns, frost-bite, and chilblains. It is put up in good-sized slabs, and retains its properties indefinitely. It can be melted for use several times over without losing any of its therapeutic qualities.

YADIL.

(London: Messrs. Clement and Johnson, 19, Sicilian Avenue, W.C.)

This registered name has been given to a new antiseptic, which is a tri-methenal allyl carbide, and is the result of a large and long-continued amount of research work. The essential point aimed at was the production of an antiseptic and germicide of decided potency which would be free from the disadvantages attaching to most of these agents, which cannot be used to their full strength as bactericides without seriously damaging the tissues of the body.

It is claimed for this preparation that it is non-toxic, non-caustic, and contains neither copper, mercury, ether, alcohol, nor phenol. It does not coagulate albumen, and, in consequence, is able to penetrate and be diffused in the tissues without injury. It thus is able not only to act upon any bacteria and spores present, but it sterilizes at the same time the medium in which these would be able to propagate. It has no action on hæmoglobin, but stimulates phagocytosis and cell-proliferation. It does not stain, and is fully miscible with water. It does not attack metals, and can, therefore, be used for disinfecting instruments of all kinds.

The liquid is clear, and has a strong alliaceous odour. Its bactericidal action is rather slower than that of phenol, but this is compensated for by the fact that it can remain in contact with tissues for any length of time without injuring them. It can be taken internally in tea, milk, or any beverage.

It has been tested in one large hospital for a few months, and has given successful results there.

a very clear but not too lengthy account of embryology, and is divided into two sections: general embryology, which includes the germinal elements, impregnation, formation of the germinal area, formation of the embryo and of the foetal membranes and placenta; and organogeny, in which the formation of the various "systems" of the body is dealt with. Throughout the book, wherever necessary, reference is made to comparative embryology, and the subject is thereby made much clearer. We should have liked to have seen a fuller account of the development of the blood and leucocytes, which are hardly touched on in the volume. The book is profusely illustrated with 304 figures in the text; these are very clear and distinct, and in some cases coloured. This manual fills a distinct gap in medical literature, and should be widely read.

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**The Scientific Treatment of
HAY FEVER and allied
ailments.**

KINECTINE

According to Dr. MOUNEYRAT, the discoverer of Galyl (the widely adopted Salvarsan Substitute).

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Non-toxic, produces no ill-effects. Easily taken (tablets) and well tolerated. Highly satisfactory clinical results.

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Rapid abortive action in the initial stages.

Curative action in the Advanced and Chronic conditions.

The Medical Treatment of CANCER.

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This treatment has passed far beyond the experimental stage.

Extract from Proceedings of the Royal Society of Medicine, February, 1913:—

Dr. GEORGE HERSCHELL, comparing electric and chemical colloid copper, stated: Chemical colloid appears to give the best results. In the following cases chemically prepared colloid was used. Experimentally it has been proved: (1) That particles of colloid copper can be demonstrated in the granulations of cancerous growths after two or three injections of the colloid; and clinically (2) There is invariably great relief from pain; (3) Appetite and strength return and the patient puts on flesh; (4) There is in many cases a diminution in the size of the tumour; (5) The injections are absolutely non-toxic, although in many cases an inflammatory reaction is manifested in the cancerous growths.

"As regards my own personal experience in the use of this method of treatment in addition to my own cases, I have had an opportunity of observing the effects in the practice of some of my medical friends, and in nearly all cases the progress of the disease appeared to be arrested."

CUPRASE is put up in boxes containing 8 ampoules of 5 c.c. each.

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SIMPLE IN USE—RAPID AND EFFECTIVE ABSORPTION. PRODUCES NO UNDESIRABLE EFFECTS.

The clinical experiences of Ehrlich, Levaditi, Sabouraud, and Bargrov have conclusively proved that the activity of 605 is greatly increased after it has been taken up and transformed by the liver, and they recommend its administration per rectum. (In special metallic cases for hot climates.)

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(In special stoppered bottles for hot climates.)

VITAMOGEN (VITAMINES).

(London and Paris : Messrs. Williams & Co., 24, Holborn, E.C.)

In this new preparation, it is claimed that the inclusion of the ferments or enzymes, known as vitamins, has been accomplished successfully, those necessary elements for proper nutrition being present in full, and even increased, activity. It is well known that these bodies are at once destroyed by sterilizing food in which they are contained, and they are lost in the modern process of milling, as well as in the ordinary methods of preparing and cooking food. This new concentrated food contains, in addition to vitamins, many other highly nutritive bodies, and is rich in organic phosphorus. An analysis shows that it contains the following proportions :—

	Per cent.
Water - - - - -	2·95
Proteins - - - - -	24·25
Invert sugar - - - - -	20·80
Starch - - - - -	31·25
Fat - - - - -	2·53
Cellulose, gum, &c. - - - - -	10·62
Ash (Phosphoric Acid, 2·61) - - - - -	7·60
	<hr/>
	100·00
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It is a light, biscuit-coloured powder, with a faint, pleasant and sapid aroma. It is given in milk, beef-tea, soups, and the like, which may be hot, but must not be boiling, or the vitamins present will be destroyed.

It is recommended for children, especially for those suffering from scurvy-rickets, or rickets, and in "deficiency" diseases like beri-beri. It is useful in any form of nervous disease, such as neurasthenia, hysteria, neuritis, and so forth, and for its general tonic-effect in convalescence after severe illness.

"OCCUPATIONAL DISEASES OF THE WAR."

(London : Casein, Ltd., Culvert Works, Battersea, S.W.)

This *brochure* contains much useful information on the diagnosis and treatment of the occupational diseases of the war, notably among the munition workers who are now so numerous throughout the country. The compilation is concise, and contains a full list of the diseases included under this heading.



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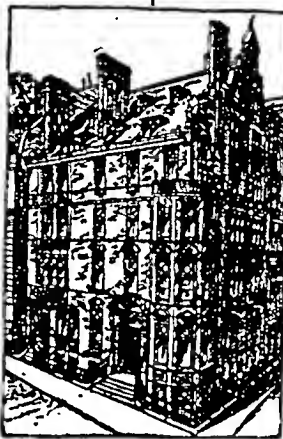
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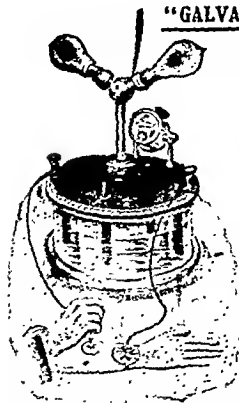
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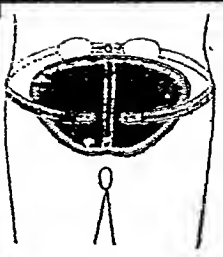
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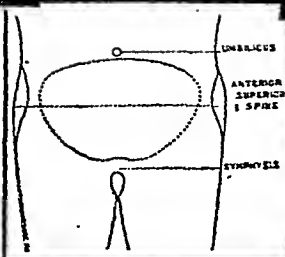
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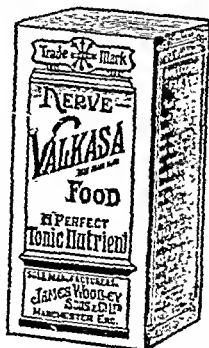
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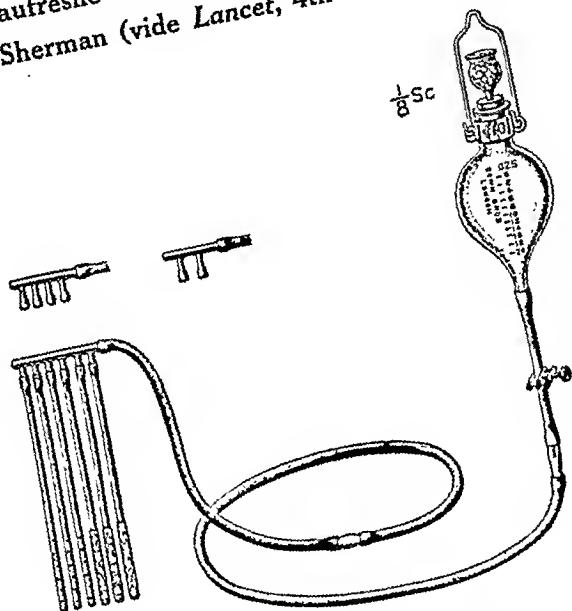
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THE PRACTITIONER.

MAY, 1917.

GUNSHOT FRACTURES OF THE ARM.*

By C. H. FAGGE, M.S., F.R.C.S. (TEMPORARY LIEUT.-COLONEL R.A.M.C.).

Surgeon to Guy's Hospital, etc.

IN this lecture, I propose to deal with the different bone-injuries commonly resulting from gunshot wounds of the upper extremity. While the situation of the injury will depend exactly upon the point at which the bone has been hit, my experience has led me to suppose, from a survey of a large number of such fractures, that certain parts of the arm are more exposed to, or get into the way of, these projectiles more than others. I shall point out in detail the different positions in which the arm may be injured, and it will be observed how extraordinary it is that, apparently, a similar missile produces a very different result at one spot to what it does at another. This must be due to the varying consistency of the bone and the relative support which it receives at any spot from the surrounding tissues, and this feature has a very decided, but not altogether appreciated, influence upon the prognosis, as I shall point out in dealing with individual fractures.

I propose to illustrate my remarks by a series of X-ray plates. In the first, the upper articular end of the humerus has been involved by a gunshot wound, and severely comminuted. In the second radiogram it is shown that the upper end of the humerus has been removed for a similar injury in another patient. It appears now to be accepted as sound practice that resection of the head of the humerus should be undertaken immediately when the head is badly damaged, particularly if the articular surface is involved. An infected wound leads down towards the joint, in which case infection is likely to occur.

In the first plate of a third patient, a similar injury to

* A clinical lecture delivered at Guy's Hospital.

HOEFFTCKE'S EXTENSION APPLIANCES. AMBULATORY TREATMENT OF FRACTURE OF THE LIMBS; TUBERCULOUS AND ARTHRITIC DISEASE OF JOINTS.

By C. A. HOEFFTCKE, 7, Harley Street, London, W. 1.

I have much pleasure in announcing herewith that I have removed from 21, Woodstock Street, W., to 7, Harley Street, W. 1 (Cavendish Square end).

I greatly appreciate the support extended to me by many surgeons and physicians since I left Holland to establish myself here, over 14 years ago.

My new place, which is much more commodious and pleasant than the old one, will, I trust, also be more convenient to the profession and patients alike.

A visit from any who are interested in the treatment of fractures and joint diseases will be very welcome, on which occasion I shall be glad to show them my Extension Table and Skiagrams of cases before and after treatment.

The case below shows what can be done with recent fractures when treated with my Extension Splint if attended to within a reasonable time of the accident.

The patient, a gentleman aet. 61, fractured his femur through a fall from his bicycle.

It was a badly comminuted fracture, where neck of femur, great trochanter and shaft were involved. I saw the patient six days after the accident: there was $3\frac{1}{2}$ inch shortening, which was reduced on

my extension table. On the tenth day after the accident my Extension Appliance was put on, and the patient was enabled to walk with



Fig. 1.—X-ray—Fracture of
of femur and shaft three
after the accident



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The case below shows what can be done with recent fractures well treated with my Extension Splint if attended to within a reasonable time of the accident.

The patient, a gentleman aet. 61, fractured his femur through a fall from his bicycle.

It was a badly comminuted fracture, where neck of femur, greater trochanter and shaft were involved. I saw the patient six days after the accident; there was $3\frac{1}{2}$ inch shortening, which was reduced

by my extension table. On the tenth day after the accident my Extension Appliance was put on, and the patient was enabled to walk with it at once.

Ten weeks later the splint was discarded, the fracture having firmly united with $\frac{1}{4}$ inch shortening only.



Fig. 1.—X-ray—Fracture of neck of femur and shaft three weeks after the accident



Fig. 2.—X-ray—Fracture of neck of femur and shaft ten weeks after the accident.

THE PRACTITIONER.^{1st}

MAY, 1917.

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* A clinical lecture delivered at Guy's Hospital.

the head of the humerus is seen, which the second radiogram shows to have been removed at a much later date.

It is well to realize that secondary excision of the head of the humerus is a much more difficult and troublesome operation, and on the whole, a matter of greater risk to the patient, than the removal of the comminuted bone within a few days of the infliction of the injury. Not only may the complication of bony ankylosis between the head of the humerus and the glenoid cavity have to be overcome, but, possibly, the fracture of the humerus is un-united and the adjacent fragments necrotic, so that traction on the arm cannot be made use of as a means of assistance in the operation. Far worse than these possibilities is the complication of massive scar tissue—a common sequela of all varieties of gunshot injuries—which makes such an operation quite difficult by obscuring the position of important structures, besides being most tedious and difficult to remove in itself.

I have never spoken about the injuries of soft parts, that result from gunshot wounds, without laying great stress on the fact that the missile, particularly if ragged, burns and destroys the tissues through which it passes over a very wide extent. It was quite a surprise to me in the early days of the war to find how common this was, and to recognize how difficult it was to overcome such a complication as an area of firm scar tissue, perhaps two or three inches in diameter. Not only does it render difficult the division of different tissues involved, but it exercises a very harmful influence as well upon the vessels and nerves passing through it, and, unfortunately, is often so widespread that it cannot be safely removed.

It is to be hoped that those who have to deal with these cases in the early stages at the Casualty Clearing Stations will, if they have not already done so, appreciate that when there is any doubt as to the future utility of the shoulder joint, it is to the patient's advantage that a primary excision should be performed.

The next series of plates are examples of injuries of the shaft of the humerus, from the surgical neck to the middle, and chiefly involve that part of the shaft which, though it gives attachment on the inner side to the coracobrachialis, and on the outer to the deltoid, is elsewhere

are, first, that it shall completely immobilize the injured limb, and, second, that it shall be so constituted as to afford free access to any wounds which may exist.

It will readily be realized that these two requirements are often in sharp antagonism, and, in many instances, it must be admitted that it is quite impossible to immobilize the limb completely for a sufficient period, because the splint or other immobilizing agent must be loosened frequently

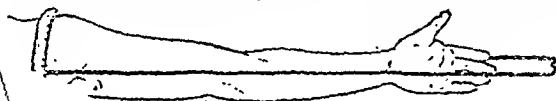


FIG. 1.

val with one or other of the patient's wounds. which I have found most satisfactorily to at injuries met with in the humerus, is the either of the original type, in which the de ²¹¹ectly straight, in fact, very similar to a

(Fig. 1),

of t tly in-

duced Robert

nes, in which side bars

bent at a right angle at

level of the elbow (see

2). When the humerus

injured in its upper third,

the degree of abduction of

upper fragment is com-

ly met with: in such

s, the fragments are

st easily brought into

reasonable apposition in the

straight Thomas's Arm

splint, the injured limb

being supported at right

angles to the body. The

disadvantage of this splint

is that it usually necessitates the patient remaining in bed

during its application.

When the lower half of the humerus has been injured,

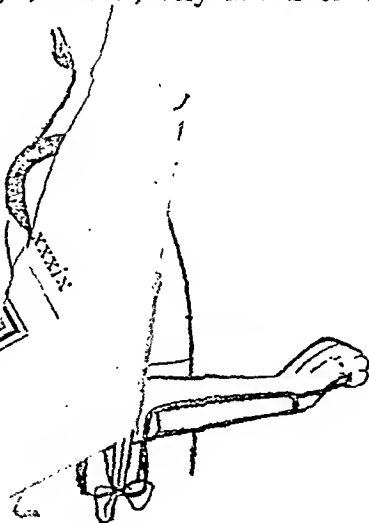


FIG. 2.

recently saw together when he was sent for an opinion as to the treatment of his arm. The question to be dealt with is an un-united fracture of the humerus, which has evidently been widely destroyed in a very similar manner to those just mentioned. Now, I know nothing about the early condition and nature of the treatment of this pensioner, and though he was wounded more than six months ago, I have not seen him until this week, but I will suggest that there are probably two factors which have influenced, if they are not totally responsible for, this unfortunate result, viz., the injudicious removal of partially detached fragments of bone, and, secondly, defective immobilization of the limb.

Whilst I entirely realize that the initial object of the operator, in dealing with such cases in their early stages, as for instance, at a Casualty Clearing Station, must be directed towards the wound rather than towards the fracture; that he must, at all costs, establish free drainage, and that to do this he should, as far as possible, remove foreign bodies, loose particles, and débris of all sorts; yet I cannot help thinking that, in such cases as this, undue zeal in removal of loose particles of bone may have been exhibited. It is important for those who may be imbued with such thoroughness to bear in mind the fact, that all partially detached fragments of bone will not necessarily die, and that, providing free surgical drainage can be established, every possible fragment of bone which may appear viable should be treated with great gentleness and respect.

I cannot but believe that at least one surgeon of eminence has done considerable harm in urging, without qualification, the general removal of all bony fragments.

Those who have had the opportunity of watching operations by Sir Arbuthnot Lane will not make this mistake, for they will realize that good use may be made of even totally detached fragments in the operative restoration of fractures. It must be remembered, however, the condition of an aseptic field offers a much freer choice for their preservation than do the septic wounds of war.

A few words may now be said about the types of splint, which I regard as most useful in the treatment of different fractures already spoken of. In selecting a splint for these cases, the requirements which have to be borne in mind

some degree of tilting of the upper end of the lower fragment has to be overcome, and for this purpose it is best to bend the elbow at a right angle. The right-angle type of Thomas's splint may here be well employed, and counter-extension may be obtained against the lower part of the ring under the axilla by bandaging the forearm firmly down to the lower half of the splint (Fig. 2). In contrast to the other type of Thomas's splint, this form is most useful when the patient is up; in fact, when used for a patient lying in bed, it will be found to be more comfortable if the patient is supported in a sitting position.

I have, on several occasions, replaced other types of splint, such as Middeldorpf's triangle, fitted elsewhere, by this type of Thomas's Arm splint, to the greater satisfaction and comfort of the patient.

Whichever type of Thomas's splint is made use of, the arm is supported at the necessary intervals on slings of flannel bandage fixed with safety pins, and in the straight type, extension is maintained with a stirrup made of strapping or of gauze, fixed to the skin by Sinclair's adhesive glue. While these splints can, with a little practice, be so arranged as completely to immobilize all the usual types of fracture of the humerus, their skeleton form, and the ease with which one or more of the flannel slings can be removed, allow of the necessary access for dressing to any wounds which may be present.

In a large number of these plates, the middle third of the humerus has been involved, and it will be appreciated that when the bony injury is at all extensive in this segment of the bone, the musculo-spiral nerve can scarcely escape injury. This injury is, no doubt, usually inflicted by the missile itself, or by fragments of bone forcibly driven into the soft parts; but it is well to bear in mind, too, that though the musculo-spiral nerve may be found intact when the patient first comes under notice, it may later be involved gradually by the reformation of bone round the fractured area. In every case, in which there is the slightest suspicion of any injury to this nerve, the fingers must be protected from the tendency to become over-stretched by the continued fixation of the wrist and hand, on a metal splint, in a position of dorsi-flexion.

of the elbow, following an old gunshot wound. In many cases, when the lower end of the humerus is badly damaged and the joint is already infected, early removal of the olecranon or a set excision of the joint may be the only available alternative to amputation, and after the number of cases which I have seen, in which, after multiple incisions to secure drainage, a secondary excision was necessitated to regain the patient a movable elbow, it is reasonable to assume that primary excision of the elbow might be more widely employed. The difficulties which are met with in a secondary excision of the shoulder do not exist to the same extent in dealing with the elbow, and my experience has been that this operation gives uniformly satisfactory results.

Only recently I received from France a letter from a young officer who, early in 1915, had his right elbow badly shattered, and at the same time suffered from multiple shell wounds of the back. After he had been in the hospital at the base in France, he became gravely ill, owing to infection of the wounds of his back; when he reached home he was still seriously septic and required several minor operations. Six months later his elbow was excised, without any further complication. When he was last seen he had a normal hand grip, and all movements of the elbow were excellent except for some diminished power of extension. He is now returned to France.

An interesting controversy over the question of which should be allowed to undergo operations as excision, nerve resection, etc., is now being undertaken. Although my experience is as satisfactory as the above, I am inclined to favour an excision in a patient whose elbow is very gravely infected with

In many examples of through and through fractures of the forearm, by which either the radius or ulna is comminuted. Even if only the ends of the bones are so extensively driven in that the articular bosses of new bone will not be in contact on pronation and supination, it is particularly likely to happen

humerus, in which the elbow joint is involved, there are several X-ray photographs of a New Zealand sergeant-major. These show that a bullet has fractured the lower end of the left humerus, with projection forwards in the upper end of the lower fragment. The same, or another bullet passed through the right humerus just above the elbow joint, and the plates show that the small lower fragment of the humerus is extremely atrophied. On both sides there had been prolonged infection of his wounds before he came to us, when he had only ten degrees of flexion in the right elbow, and complete ankylosis of the left. On the left side, too, a segment of humerus had been destroyed by the initial injury and by necrosis, so that after some months no union had occurred. In the early stages, it was no doubt impossible, owing to continued local sepsis and the serious condition of the patient, to attempt to get the fragments of the left humerus into reasonable apposition, so that when his wounds began to heal and the patient himself improved, I had to deal with the problem of an un-united fracture about four inches above the elbow-joint, which was ankylosed.

At a reasonable time after the wounds in the left arm were healed, the ends of the fractured humerus were exposed, refreshed and secured with a Lane's plate. In spite of slight sepsis in the old wound—which ended in the formation of a sinus, and will, no doubt, eventually necessitate the removal of the plate and screws—firm union has taken place, and the patient has returned to New Zealand. He can now write, feed himself, and, with slight assistance, put on his clothes; but it was intended, had he remained here, to consider later whether the excision of one or both elbow joints would not give him more useful arms. At present, he is inclined to be satisfied with, what would appear to others, only a partial success; for more than six months, he was absolutely unable to use either hand for any purpose at all—a distressing condition, which, especially for one so ill, he bore with unusual content and patience.

What has been said about the value of excision in gunshot wounds involving the shoulder is equally true of the elbow-joint, but there is no joint in the body in which secondary excision can be undertaken so usefully as for ankylosis

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Only recently I received from France a letter from a young officer who, early in 1915, had his right elbow badly shattered, and at the same time suffered from multiple shell wounds of the back. After he reached the base in France, he became gravely ill, owing to gas infection of the wounds of his back; when he reached home he was still seriously septic and anæmic, and his elbow required several minor operations before it healed. Six months later his elbow was excised, and it healed without any further complication. When he was last seen he had a normal hand grip, and all movements of the elbow were excellent except for some diminished power of extension. He has now returned to France.

There has been much interesting controversy over the question of the period of time which should be allowed to elapse before such secondary operations as excision, nerve suture, or bone plating, are undertaken. Although my experience has not always been as satisfactory as the above it is interesting to record so normal an excision in a patient who, within the year, had been very gravely infected with gas-producing organisms.

Our experience has afforded many examples of through and through bullet wounds of the forearm, by which either one or both bones are seriously comminuted. Even if only one bone is injured, bone particles are so extensively driven into the soft parts that irregular bosses of new bone will commonly form later, and limitation of pronation and supination frequently result. This is particularly likely to happen

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Fig. 4.)

The last series of X-ray plates show, in different positions, a common feature, viz., non-union from defects of the ulna. As in civil life, so after gunshot wounds, the ulna shares with the humerus the unenviable reputation of being prone to remain un-united. In two of these three cases, the earlier plates show considerable atrophy of the smaller, that is, the carpal fragment of the ulna. In all three, after some interval, the affected bone was cut down upon, and after refreshing the broken ends, the fragments were fixed with a Lane's plate. In one case, the broken ends could not be brought together, and the gap was bridged by a bone graft. In this case very severe local infection resulted, and the metal plate with the graft had to be removed.

This patient, when his forearm became reinfected after my operation, volunteered the remark that a similar degree of infection had existed at the time he was wounded, and that his arm had been kept in a bath for five weeks. I have no doubt, therefore, that latent infection still remained in his tissues, and that though an interval of time, then considered sufficient, had been allowed to elapse after his wounds were healed before operating, this was not sufficiently long for such a patient, who had previously suffered from grave local infection. In the other two cases, mild degrees of infection followed the operation, and, ultimately, the plates had to be removed. Union resulted in one case, but in the other, where the final result was complicated by a divided ulna nerve sutured at the same operation as the plating, the bone union was still only partial when the patient was last seen. It has been my practice since this date not to suture wounds made for plating old septic gunshot fractures, and to regard removal of the plate as a necessary minor operation; but this should not be done until at least six weeks have elapsed after plating the ulna, and about ten weeks when the humerus has been dealt with.

It will be noticed that in two of these cases one factor which may have influenced the occurrence of non-union, is abduction of the lower fragment of the ulna, whereby its upper end is widely separated from the lower end of the upper fragment, and this is due to the unopposed action

when both bones are fractured, but whilst, in many cases, such a result is inevitable, I cannot help feeling that some responsibility for its frequency lies with those who advocate the immobilization of such fractures on an internal angular splint.

As far as I have been able to ascertain, it is the universal rule, in text-books and books of instruction for R.A.M.C. Officers, that such fractures should be splinted with the radial border of the forearm and thumb upwards. It is conceivable that such a position may bring the broken ends into best apposition when the radius is broken above the insertion of the pronator radii teres, but in most fractures of the forearm due to gunshot wounds, displacement of fragments is not an important feature, and if it is desired to prevent cross union, this can best be avoided by maintaining the bones parallel with the hand in a completely supine position.

Again, it will be agreed that supination is the movement likely to be defective after such injuries, and supination is the movement of far more general utility than pronation. If, in such a fracture, the forearm is maintained in complete supination, either on a bent Thomas's arm splint, with extension from the wrist, or on an anterior angular elbow splint, the probability of the ultimate result being prejudiced by limitation of supination will be eliminated as far as possible. The theoretical objection to this may be the fairly widespread prejudice against the anterior angular splint, because it has been held to be one of the factors in inducing Volkmann's ischæmic contracture. It has been a surprise to me that no instance of any such contracture in the muscles of the forearm has been met with during the war, in contrast to the fairly common tendency of talipes equinus to follow extensive gunshot injuries of the calf.

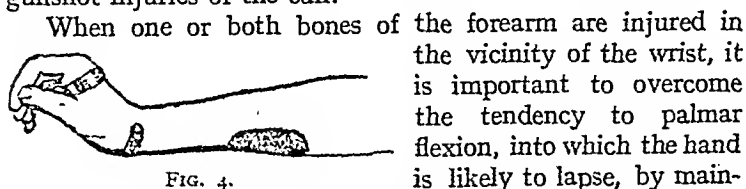


FIG. 4.

When one or both bones of the forearm are injured in the vicinity of the wrist, it is important to overcome the tendency to palmar flexion, into which the hand is likely to lapse, by maintaining some degree of continued dorsiflexion; an observation which, like many others of much value in the treatment of these bone injuries, we owe to Colonel Robert Jones. (See

SECONDARY HÆMORRHAGE.

BY JAMES TAYLOR, F.R.C.S. (CAPTAIN R.A.M.C.).

Surgical Specialist, Cambridge Hospital, Aldershot.

THE treatment of secondary hæmorrhage is one of the most difficult and anxious problems that come before the military surgeon, and in hospitals dealing with recent gunshot wounds it is an accident of rather frequent occurrence. The cases are almost invariably very septic. The patient is seriously ill from septic absorption, ill-fitted to bear even a slight loss of blood, and often has to undergo a major operation before the bleeding can satisfactorily be controlled. The choice of the method of treatment is often a very difficult one, although in other cases, unfortunately, there is no choice in the matter, and one finds oneself compelled to carry out some treatment that leaves the patient only a very small chance of recovering. The question of the possibility of saving limbs is a problem that is constantly coming up, and often adds greatly to the difficulty in deciding the line of treatment that should be adopted.

Performing the emergencies in one of the military hospitals, I have had a fair number of these cases to treat, some of them, I am sorry to say, with very untoward results, but even these failures often teach one valuable lessons, and some of the cases were of distinct clinical interest.

Where possible, the wound was opened up, and the vessel controlled at the bleeding point. In this way, there was less danger to the life of the limb, but in many or most of the cases, this method of treatment was impossible. The parts were swollen and infiltrated to such an extent that the relations could not be recognized. The tissues were so friable that they would not hold instruments or ligatures, and the patients were so ill that they would not stand the longer operation of ligature in the wound. Proximal ligature or amputation had to be resorted to. But, in cases in which it was possible to expose the artery in the septic area, the results were good, and there was no recurrence of the

of the pronator quadratus. A similar adduction of the radius is likely to spoil the functional result of a gunshot wound in the lower third of the radius, and can, to a large extent, be obviated by maintaining the hand and forearm in full supination.

Much has been written lately about the value of bone grafts in the treatment of un-united fractures, and American periodicals teem with articles making invidious comparison between this method and the use of Lane's bone plates.

It appears to me that bone-plates and screws on the one hand, and bone grafts on the other, are not alternative any more than they are separate methods; by which is meant that, in a large percentage of cases in which I have felt constrained to employ a graft, it has appeared necessary also to introduce a plate. Perhaps this can best be explained by detailing the fundamental principles which I regard as governing bone grafting.

1. The graft must consist of compact and cancellous bone, the former for rigidity and to give purchase for screws, and the latter to ensure bone reproduction; for it is now believed that bone reformation is chiefly due to the multiplication of cells which exist in the cancellous tissue.

In my experience, the grafting of a layer of periosteum on the surface of the bone graft is not essential, and has the disadvantage that excessive bone formation is likely to occur at the place from which the bone graft was taken, owing to the removal of the limiting periosteum.

2. The graft must be autogenous.

3. It must be firmly secured in position, and must be subjected neither to stress nor strain. Now, if this third proviso is to be fulfilled in dealing with cases in which a definite gap has to be bridged, it appears to me essential that the separated fractured ends and the intervening graft, however well they may be mobilized on a splint or in plaster-casing, must be secured to one another in some way. Believing that this fixation can only be brought about incompletely by suturing with catgut or kangaroo tendon, as advocated by Albee I have been in the habit of securing the broken ends in due alignment with a long plate and screws, so arranged as to fix the intervening graft in its proper position.

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hæmorrhage afterwards.

Lance-Cpi. R., 19 years, was wounded on July 7, 1916, by a shell fragment. He was admitted with a very septic compound fracture of the tibia at the junction of the upper and middle third, with wounds on the outer and inner side of the leg. On August 8, he had secondary hæmorrhage. The wound on the inner side was enlarged upwards, and the posterior tibial artery exposed in much the same way as is done in ligature in the middle third. A hole was found in the side of the vessel. A ligature was applied above and below this, and the artery divided between. There was no further trouble with bleeding.

Of all secondary hæmorrhages, those occurring in gunshot wounds of the thigh, especially with fracture of the femur, were the most serious. Almost all the deaths I have had were due to bleeding from the femoral artery. If the wound is in the upper part, necessitating ligature of the common femoral, gangrene almost invariably takes place, and yet most of the patients will not stand an amputation in their toxic and relatively bloodless condition. In quick succession, I lost two cases after ligature of the common femoral. The patients never got into a condition in which amputation could be thought of. The leg in each case became rapidly gangrenous and they died within 48 hours. In another case, in which the wound was lower in the limb, the patient's life was saved by ligaturing the superficial femoral first, and amputating 12 hours later.

Private T., 21 years, was wounded in the thigh, at the junction of the middle and lower third, on July 1, 1916. There was a large ragged wound on the antero-internal surface.

The femur was much comminuted. A small wound had been made at the back for drainage before he was sent over from France. The tissues all round the wound were infiltrated and in a very septic condition.

On July 15, he had a severe secondary hæmorrhage. His life was in serious jeopardy from the sepsis, apart from the hæmorrhage, and permission was obtained to amputate, but, when he was taken to the theatre, he was so collapsed that this was out of the question, and the superficial femoral was ligatured at the apex of Scarpa's triangle. The following morning the condition was improved, temp. $101^{\circ}\cdot4$ F., pulse, 130. The leg and foot were warm, but wax-coloured. Patient was now taken back to the theatre, and under stovain and light ether anæsthesia, the leg was amputated in the region of the wound without any attempt to make flaps.

Secondary hæmorrhage again occurred from the stump on th

29th. This was found to be coming from a branch of the deep femoral, and was controlled by passing a ligature on a needle close to the bone and tying the vessel with some of the other soft tissues. Patient made a good recovery and had a flap amputation done later.

The sepsis is the serious factor. In one case, in which the infection was not bad, I was able to save the leg, although both artery and vein had to be ligatured.

Patient was admitted to hospital from France a week after his injury. He was hammering a piece of metal on an anvil, when a splinter flew off and struck him just over Hunter's canal. He was admitted with an irregular wound on the inner side of the thigh, plugged with gauze. When the medical officer removed this, severe bleeding took place. A tourniquet was applied. When the wound was opened up, it was found that bleeding was coming from both artery and vein. Sepsis was not very marked, and it was thought justifiable, as the patient was in excellent condition, to try and save the limb. The two vessels were isolated in the wound and ligatures passed round them above and below the point at which they were injured. He made a good recovery, and there was only slight gangrene of the tip of one of the toes.

Hæmorrhage in arm wounds was much less serious. Even when there was considerable sepsis, the axillary or brachial artery could be ligatured without any serious effect. There did not seem to be any greater tendency for the infection to spread after ligature. In two of these cases, hæmorrhage occurred a second time. In the first, the wound was on the inner side of the upper forearm. The ulna was fractured, and the wound was deep, ragged, and septic. The brachial had been tied in France. Hæmorrhage again occurred from the depths of the wound. It was considered to be coming from a branch of the ulnar artery, although it was impossible to tell exactly where the bleeding point was. The ulnar artery was ligatured in its upper third, close to the bifurcation of the brachial, as well as in the lower third to prevent recurrent flow, and the bleeding completely stopped. Patient made a satisfactory recovery. The following are the notes of the other case.

Private W., 34 years, received a shrapnel wound of the arm, July 25, 1916. He had two large wounds in the upper third of the arm. About an inch of the humerus had been carried away, and one could see right through the limb. In the lower third of the arm, there were three wounds, and here, again, the humerus was fractured. The limb was supported on a Thomas extension splint. The whole arm

was swollen and œdematous. On August 14, he had a severe secondary hæmorrhage. The blood came from one of the lower wounds, and seemed to come from deep in the swollen arm. After the patient was under an anæsthetic, the tourniquet, which had been applied close up to the axilla, was removed with a view to finding if ligature in the middle of the arm would be sufficient to control the bleeding. As pressure over the brachial here was of no avail, it was thought that the ligature must be applied higher up, and the third part of the axillary was tied. Patient remained all right till the 17th, when hæmorrhage recurred. On this occasion it was controlled by compressing the vessel between the two wounds. A ligature was applied here, and there was no further trouble with bleeding. He had slight gangrene of the tips of the fingers, but the wounds healed, the bone united, and patient ultimately got a very good arm.

In this case, I think, there was an error in treatment. As I could not control the bleeding by pressure over the middle of the brachial, I thought the blood must be coming from either the superior or inferior profunda artery. The real condition was, I think, that, on account of the swelling and œdema, pressure could not be properly applied, and the hæmorrhage was coming directly from the brachial all the time. The recurrence was then due to the blood passing through the anastomosis, between the axillary branches and the branches of the upper brachial, washing the newly-formed clot out of the main artery.

Gunshot fractures of the jaws were a fertile source of secondary hæmorrhage. Many of these were slight and could be treated by syringing the mouth with cold water, but, on the other hand, when they recurred again and again, it was necessary that something more radical should be done. As it was quite impossible to reach the bleeding point, and often very uncertain which vessel was bleeding—the tongue was often injured—ligature of the external carotid was the operation usually done. After this operation, in no case was there any serious trouble with bleeding afterwards. In one case, in which the common carotid was tied, severe bleeding recurred later.

Lieut. C., was admitted with a gunshot wound of the face and fracture of the jaw. In France soon after his injury, he had severe bleeding from the wound. There was much infection and the right side of the neck was greatly infiltrated. On September 10, 1916, there was severe secondary hæmorrhage. On account of the œdema and swelling, it was impossible to expose the external carotid, and the common carotid was ligated by Major Gordon Taylor. Patient

had lost much blood and recovered very slowly. His convalescence was further delayed by pneumonia. On October 12, 1916, there was hæmorrhage from the wound in the neck, left after the ligature of the artery. The patient was put under an anæsthetic, and the wound carefully examined. The bleeding was now completely arrested, and it was impossible to detect the bleeding point. The following day patient bled again. On this occasion examination under an æsthetic showed a hole in the facial artery close to its origin. The blood was coming by anastomosis from the other side and escaping through this opening. This vessel was ligatured and there was no more hæmorrhage, but in the manipulation, from one of the vessels, I displaced a clot resulting from the previous operation, and this, lodging in one of the cerebral vessels, caused a hemiplegia, of which patient died in 36 hours.

In some of the cases, hæmorrhage had a tendency to recur again and again. The most remarkable case I had bled altogether six times, definite measures being taken each time to arrest it.

Private W., 24 years, was wounded with a machine gun, July 1, 1916. He had a large lacerated wound over the anterior surface of the left leg, just below the knee-joint. Both bones were fractured, and there was much comminution of the tibia. The lacerated muscles were bulging out of the wound, which was very septic. There was a pulse in the anterior tibial at the ankle, but not in the posterior. August 17: Recurrence of hæmorrhage. The wound was explored. Septic material scraped away, a fair sized vessel in the lower part of wound ligatured, and the actual cautery applied to the rest. August 19: Amputation through knee by the guillotine method was done, on account of sepsis. August 22: Hæmorrhage from small artery in stump. This vessel was ligatured. Later, the same day, another small vessel began to bleed. The femoral artery was ligatured in Hunter's canal and this, for a time, ended the trouble from hæmorrhage. September 15: The stump had become fairly clean, but patient was suffering great pain from infection spreading along the sciatic nerve. As he had to have sedatives every night before he could sleep, his secondary amputation was done now instead of waiting till stump was completely covered with healthy granulations. September 21: Sharp hæmorrhage occurred from the stump. An anæsthetic was given, and the wound examined. It looked well, nearly healed, and with no sign of sepsis. The flaps were opened up and search made for the bleeding point. Two small muscular branches were discovered bleeding. These were tied, and the flaps sutured again without drainage. Primary healing took place, and patient made a good recovery.

I have been impressed with the importance of at once dealing with these hæmorrhages by some radical method in

nearly all cases where there has been a definite bleeding. Oozing, say, from a fractured jaw, may be temporized with for a time, but if there is distinct arterial hæmorrhage, it is a mistake to put off time with packing or any other temporary measure. Bleeding almost invariably recurs and operation has to be resorted to in the long run, when the patient is less fit to stand it. One is struck with the fact of collapse being out of all proportion to the amount of blood lost. This, I think, is due to the heart, degenerated through septic intoxication, being greatly hampered by even a small sudden loss of circulating fluid.

In the immediate after-treatment, everything was done to give the patient a free supply of fluid. Intravenous saline was hardly ever given, but almost invariably subcutaneous infusion was carried on for 24 to 36 hours. Rectal salines were also administered, and the patient was given abundant fluid to drink as soon as he recovered from the anæsthetic.

Beyond the ordinary cleansing and drainage of wounds, I consider that little can be done to prevent secondary hæmorrhage. Several of the medical officers, however, observed that bleeding seemed to be more frequent in cases in which eusol was being used. It may have been a coincidence, but there were more cases of hæmorrhage from the wards where it was being used as a routine. It is possible that it has a digestive effect on the softened walls of the vessels.

I am much indebted to Lieut.-Colonel Wilson for permission to use the hospital records, and I have to thank Major Gordon Taylor for his help. Captain McLeod has also been very kind in supplying me with notes and assistance.



THE CONVALESCENCE OF DYSENTERY AND ITS COMPLICATIONS.

By ALFRED HOWELL, M.D., M.R.C.P., MAJOR R.A.M.C. (T.).

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THIS paper is a review of the clinical notes of 200 cases of dysentery, under the writer's care, at the Third Western General Hospital, Cardiff, and admitted during the winter of 1915-16. Practically all these cases came from Gallipoli, and were convalescent.

This period in the history of dysentery is not rich in complications, yet some note of the later course of the disease, will supplement the more acute—the more striking stage—and thus help in completing the clinical picture. The proportion of amœbic to bacillary infections, among Mediterranean cases is difficult to fix.

Ronald Ross¹ states that in Alexandria, in 1915, pure bacillary dysentery was not very common, and of 33 necropsies, 16 were found to be of amœbic origin. 55 per cent. of the Egyptian cases are said to be amœbic.² The results of enquiry in cases sent home vary. Wenyon, in 1,500 examinations of 500 Mediterranean cases, found *entamoeba histolytica* in only 10 per cent. The remainder were not all bacillary. Penfold³ in 103 similar cases found evidence of previous bacillary infection in 47·5 per cent.

In a recent paper, Magner⁴ summarizes his results in 300 cases as follows:—*E. histolytica*, the sole pathogenic agent detected in 36 cases; *B. dysenteriae*, the sole pathogenic agent detected in 23 cases. Both *E. histolytica* and *B. dysenteriae* detected in 8 cases. *B. Morgan* No. 1 isolated from 13 cases.

Generally these findings indicate an equal incidence of the two types.

In Magner's cases the proportion of bacillary cases was much lower in the earlier months (September, October, and November, 1915), than in a later period (December, 1915 to March, 1916). He concludes that the type was almost alto-

gether amoebic in the earlier, with a decided increase in the bacillary form in the later, period. Treatment by emetine abroad had ridded many of these cases of their amoebæ. These findings are fairly applicable to the cases now recorded, for they came from the same source, and were under notice over a similar period of time, that is, from October, 1915, to February, 1916.

Clinically, one is somewhat hampered by not having seen these cases in the acute stage. The histories of onset, as given by the men, are of value. The number of men, who suffered from diarrhœa, with or without passage of blood, but yet did not go "sick," is remarkable. There is a frequent history of diarrhœa of some duration, or of a second attack, which, with passage of blood, so weakened the patient that he could no longer get about.

Of the 200 cases, 191 gave a history of passing blood, varying from three days to one month. The average duration in 36 cases, taken in sequence, was eight days.

Vomiting is reported in 11 cases, rigor in four only. There were only nine without record of blood in the stools. Such cases must be treated as dysenteric, for amoebic diarrhœa may last for months, without a trace of blood in the stools. They are particularly dangerous by reason of their mildness, for they may escape treatment, and are liable at any time to develop serious symptoms of the disease; it is said that dysentery, leading to liver abscess, may occur without diarrhœa.

Of eleven separate attacks, in which no blood was passed, in only one case was there a history of injection with emetin, though out of the total of 200 cases, 109 gave a history of emetin injection before admission.

One group of cases must be closely scrutinized, cases sent home as debility, neurasthenia, etc. For instance: Five cases in one ward sent home, one for trench foot, two as rheumatism, one as neurasthenia, and one V. D. H., a definite history of dysentery was apparent in three, and a mild diarrhœa in a fourth. One of these men had had no dysentery while in Gallipoli, but had had two attacks in France, nearly a year before. He was still infected.

Another of the five is interesting. He was cook in a well-known regiment. Fifteen years ago, he had dysentery

in the South African War. In September, 1915, he had dysentery in Gallipoli, passing blood for five days. One month later, he went to Salonika on his way to Serbia. Getting wet through there, night after night, he developed rheumatism, and was sent to hospital for this complaint, arriving at Cairo in November. He had had diarrhoea since early September, and this continued till the end of November. During the greater part of this time he was acting as cook to his regiment, a particularly dangerous position for a dysenteric to hold. He was found, after admission, to be infected with dysentery. Many of these men, in their keenness to "carry on," deliberately keep away from the medical officer, for fear of being sent down "sick." Another of these five men was also infected.

There is another group, in which a history of dysentery is shadowed by subsequent typhoid infection. For example, in a ward of seven enteric convalescents (one a paratyphoid), five gave a good history of a previous attack of dysentery.

The routine examinations—the blood by Widal's method against both dysentery and typhoid, and the usual bacteriological examination of the fæces—are valuable aids in such cases.

A convalescent enteric, showing anomalous relapses, should always suggest the presence of co-existing dysentery. There was not one fatal case in this series.

COMPLICATIONS.

(a) *Gastro-intestinal*.—The peritonitis, the perforation, and the severe hæmorrhage of acute dysentery were not seen. There was one case of decided tenderness over the liver, with a temperature of $102^{\circ}\cdot8$, which yielded rapidly to emetine. This may have been, probably was, a case of amœbic hepatitis. It will serve to emphasize the importance of watching the liver in any pyrexia of dysentery; for inflammation of this organ the "pre-suppurative stage of amœbic hepatitis," first described by Sir Leonard Rogers,⁵ is halfway to abscess. This latter fact, and its curability by emetine, make early diagnosis a matter of great moment. Amœbic hepatitis may occur during the acute stage. The combination of fever with liver tenderness at once points to the condition. In chronic dysentery, in which the tempera-

gether amoebic in the earlier, with a decided increase in the bacillary form in the later, period. Treatment by emetine abroad had ridded many of these cases of their amoebæ. These findings are fairly applicable to the cases now recorded, for they came from the same source, and were under notice over a similar period of time, that is, from October, 1915, to February, 1916.

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pain was referred to the neck, the painful point was, in every respect, identical with that of diaphragmatic pleurisy.

Severe constipation occurred in three cases, in which the bowels, before the attack, had been regular.

One form of diarrhœa was noticed, in which the motions are small but normal in appearance, there is little pain, and the movements are from three to six times a day. It is inclined to persist. Dieting and ordinary remedies have no effect on it, but it yields readily to one or two doses of enema opii. I have looked upon these cases as nervous in origin, possibly due to hyperæsthesia of the mucous membrane of the lower bowel, or to irritable weakness in a long-suffering sphincter.

Frequent micturition occurred in three cases; only one complained of pain in passing urine.

2. *Cardio-Vascular*.—Definite anæmia occurred in 13 cases. There was pronounced puffiness of the face in one of these. Slight cardiac dilatation (to the vertical nipple line), was common, but nothing approaching acute dilatation was seen. Contrary to expectation, the blood pressure (systolic) was well within normal limits.

3. *Nervous System*.—There were three cases of peripheral neuritis. In one case, the onset was with a temperature of 102° , followed in a few days by decided difficulty in walking. Pain appeared in knees, calves, and around the ankles some seven weeks after the onset.

In a second case, the most severe of the three, in a soldier of 48 years, there was diarrhœa for about 14 days, while digging in the trenches. At the end of seven days his hands got weak, so that he could not hold the spade. Two days later he could neither walk nor stand. He had to be carried to hospital, and while on board ship could not feed himself. Pain was only felt some five weeks after onset, but then very severely in the limbs, and especially in the calves. *On admission*, there was considerable interosseous wasting, his thenars and hypothenars being decidedly flattened. He could not button his coat, hold a knife and fork, or pull on his socks. The arms and shoulder-girdle were much wasted, and so were his legs. He could not walk, and though there was no definite foot-drop, the power of flexion at the

ture is normal, often subnormal, any rise above the previous line should lead to examination of the liver.

There is a difficult group of cases, in which the early indications of the disease may have been so slight, as to have been overlooked, or so long ago as to have been forgotten. A history of diarrhoea, with or without constipation, should make one careful. It must be remembered that hepatitis, going on to liver abscess, may occur without any previous disordered action of the bowels. The majority of these people have lived in the tropics, but the sufferer may never have been out of this country. Such a case has recently been described by Wenyon.⁶

What are the symptoms of this condition?

1. Fever, which may last for weeks.
2. Hepatic pain and tenderness; these may, however, be absent.
3. Enlargement of the liver. The right lobe is more commonly affected. Increase in size of this organ is so usual that it has been suggested that every case of amœbic dysentery on admission should have its liver dulness mapped out, for subsequent reference in case of doubt. X-ray examination may show a high and fixed right dome of the diaphragm.
4. Leucocytosis. Rogers gives this as a valuable sign. The usual extent is 15,000 to 20,000. A significant feature of this increase is that the polymorphs retain their normal ratio (*i.e.*, 60 to 70 per cent.) to the total white count.
5. Referred pain in the right side of the neck and the right shoulder.⁷ The inflamed liver irritates the adjacent surface of the diaphragm. This is innervated from the third, fourth, and fifth cervical roots, and pain is referred along the corresponding neck and limb distribution of nerves arising therefrom. Capps,⁸ in a recent study of the question, found in 61 cases of diaphragmatic pleurisy investigated, that referred neck-pain occurred in 33, usually over the trapezius ridge, occasionally over the shoulder-cap and supra-clavicular space. In six cases of subphrenic inflammation, in which

pain was referred to the neck, the painful point was, in every respect, identical with that of diaphragmatic pleurisy.

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ankle was very poor. There was loss of sensation to wool and pin below both wrist-joints, to wool over the left toes, and to pin over the toes of both feet. Definite tenderness of calves. No cranial or sphincter affection. This case illustrates the toxic effect of the disease on the motor nerve cells in the anterior cornua. Though rare, when it does occur, it is both rapid and severe. In the third case, there was diarrhoea lasting seven days, and nine days later he could not stand. On admission, he had severe pain in calves and thighs, with pronounced wasting, and could hardly walk. The grip was very weak.

Reflexes.—In two cases, the knee-jerks were absent on admission; the Achilles-jerks in all three. In the cases in which both were absent, I have found the knee-jerks return before the Achilles. In two cases, the triceps-jerks were absent, and were very slow in returning in one. The wrist-jerks were absent on admission, and remained absent in all three.

The sera of these three cases were examined by the Lister Institute for me. In two cases (and they were the most severe), the serum was positive to both Shiga and Flexner bacilli, but negative to dysentery Y.

The mild case was negative to Shiga, Flexner, and Y. There are few reciprocal co-agglutinins for these two organisms; so that these findings definitely indicate a bacillary dysenteric infection.

That dysenteric peripheral neuritis should be due to a bacillary infection one would naturally expect, seeing that similar nerve lesions follow bacillary infections, in diphtheria, typhoid, and influenza. Whether a similar condition can arise in a case of amœbic infection, pure and simple, is open to question. It must not be forgotten that a protozoan—the parasite of malaria—is capable of giving rise to a well-marked peripheral neuritis. Under treatment, all three got practically well.

Arthritis.—There were two cases. One was admitted with considerable effusion in both knees. No other joints were affected. He had had persistent diarrhoea for 10 weeks, passing blood for three weeks, and was suffering from diarrhoea on admission. The knees were very painful. There was but slight rise of temperature. The leucocytes numbered

7,600.

In the second case, only the right knee-joint was affected. Diarrhoea had existed for three weeks. The amount of fluid in the joint itself was not great, but the bursa over the semi-membranosus tendon was much distended, and very tender. No other joint involved. Leucocytes = 12,000.

There was decided ankle-clonus on the affected side only. The knee and Achilles-jerks were present in both cases, but in the second case the triceps and wrist-jerks were absent. Osler⁹ says that occasionally an arthritis may occur in the amoebic form, and Rogers states that it was a not infrequent sequel of dysentery in the South African War.

The absence of the triceps and wrist-reflexes, and the relatively low white counts strongly suggest that the arthritis in these two cases was due to the bacillary infection. Moorhead¹⁰ found emetin rapidly curative in six cases of dysenteric arthritis, in four of which there was proof that the disease was amoebic in origin.

Of so-called rheumatism, there were 16 cases. I have no doubt that, clinically, these are of the nature of fibrositis. Thirteen were local, the shoulder, or the back, being most frequently affected. Three were general, back, knees, and shoulders, with corresponding difficulty of movement.

The features of these general cases were the considerable pain, stiffness, absence of pyrexia, and extreme chronicity. Massage was the only thing found of benefit, and to this they responded very slowly. Fibrositis is fairly common in all soldiers exposed to trench conditions, but it is more than probable that dysentery increases the liability, if it does not directly cause it.

Pneumonia.—There were two cases. One developed the disease 19 days after admission, the left lobes being successively involved. He had crisis on the tenth day. The second case had pneumonia on board ship, one week before admission; when seen there was decided dulness of the right lower lobe, with crepitations.

Both suffered from severe diarrhoea during the fever, and for some three or four days after the temperature had become normal. In the case that developed pneumonia in hospital, the diarrhoea began on the fourth day, and was very severe; the man was reduced to a mere skeleton, and

very nearly died.

Diarrhœa, in the course of uncomplicated lobar pneumonia, is rare. The depression produced by an attack distinctly favours a relapse of dysentery. In both these cases, emetin, given at various times, was very effective in checking the diarrhœa, but was only tried after other means had failed.

Other Infections.—One had rheumatic fever while abroad. Two developed enteric. Three had paratyphoid, two being A, and one B. All ran an uneventful course except one of the A cases, in which there was prolonged pyrexia, with persistent diarrhœa.

I wish to thank Colonel Hepburn, V.D., Commanding Officer of the 3rd Western General Hospital, Cardiff, for permission to use the clinical notes of the cases upon which this paper is based.

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SHELL SHOCK STAMMERING AND OTHER AFFECTIONS OF VOICE AND SPEECH.*

BY CORTLANDT MACMAHON, B.A.

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Staff of King Edward VII.'s Hospital for Officers, Princess
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Shell Shock Stammering.—The stammer which has its origin in shell shock is, in my experience, one in which there is chiefly difficulty in the production of the voiced consonants and vowel sounds, and which does not present the general difficulties met with in the ordinary stammer. It may be described as a more or less severe inhibition of the speech, and is accompanied in some cases with amnesia, or the forgetting of words which obviously are required, but for which other words are substituted. The condition is very suggestive of the type of aphasia known as aphemia, with which I will deal later. The prognosis of such cases is generally good, and in mild cases it is best to leave the trouble quite alone, for as the patient's general condition improves the stammer disappears. In more severe cases, instruction should be given, and, as a preliminary, the patient should be taught to fill the lungs in a proper manner. This is brought about by the acquirement of an inferior lateral costal expansion during inspiration, whilst during expiration the abdominal muscles must contract slowly and strongly, so that the diaphragm is pressed upwards by the abdominal viscera, the lower ribs drawn downwards and inwards, and the air expelled from the lungs definitely and adequately. This latter action I describe as the motive power of the voice, and I train the patient to rely upon it very much indeed as he speaks.

The steady breathing produces a sense of repose in the stammerer, and the emotions of nervousness and anxiety yield very readily to it. One impresses upon the stammerer that any raising of the upper chest or tensing of the muscles of the throat, tongue and jaws, is fatal to the

* A paper read at a meeting of the Medical Society of London.

acquisition of normal speech. The method of breathing which I employ is fully described in the *Transactions of the Medical Society of London*,¹ and elsewhere.

The next step is to teach the main vowel sounds and their resonator positions, which means the correct position of the tongue and lips, and the distance between the teeth for each main vowel sound. When the sounds are correctly shaped for, the fullest resonance is given to each sound by overtones and harmonics being produced to their fullest extent with the greatest possible ease. The main vowel sounds are OO, OH, AW, AH, A, EE. A general description of their positions is that the lips are forward, the tip of the tongue near the lower teeth, and the distance between the upper and lower teeth is from one-third of an inch for OO to two inches for AH; for A the teeth nearly meet, and for EE the teeth are touching.

These same sounds combine in six ways:—(1) AH and OO, as in the word "sound": (2) AH and EE, making the long "I": (3) AW and EE, as in "boy": (4) OH and OO, as in "road": (5) A and EE, as in "rain" and "fair": (6) EE and OO, as in "new" and "you." A third and last group is formed by words in which no main vowel sounds or compound sounds appear. Such words are placed either on the open AH position or the closed EE position, e.g., words like "long," "on," "have," "not," "from," "abbot," "love," and "among" are on the position of AH, and words like "little," "it," "ring," "sister," "first," and "minister" are on the position of EE. This arrangement affords an extremely easy and practical way of learning the vowel positions in nearly all words, and is quite sufficient for all practical purposes.

The consonants are divided into two classes—the "voiced," and the "breathed." The "voiced" consonants are produced with vibrations in the vocal cords, and must be produced slowly so that, during instruction, the vibrations are distinctly heard. The "breathed" consonants are produced quickly and lightly, and the vowel sound in the word immediately sought for. The "voiced" consonants are B, D, G, J, L, M, N, R, V, W, Y, and Z, and

¹ See paper on "Gunshot Wounds of the Chest," by C. MacMahon in Vol. 39 of the Society's *Transactions*.

of these consonants the W is the OO sound, and Y is the EE sound. The "breathed" consonants are C, F, H, K, P, Q, S, T. All this knowledge is very easily acquired, and with a little practice the correct production of the vowel sounds and consonants is automatically performed. Generally, this amount of instruction on vowel sounds and consonants, combined with steady practice in breathing exercises, is sufficient for a stammerer who has only commenced to stammer from shell shock, and has not acquired the physical disabilities which supervene in a stammer of long standing.

There are many stammerers whose stammer has existed since childhood and has been seriously intensified by shell shock or wounds; there are others whose affliction has been overcome, but has been resuscitated by the same causes. These cases are very much more difficult to deal with, and the instruction must necessarily be much more definite, and takes a considerable time. Several alliterative examples must be given for each of the consonants, which must be regularly practised, and the vowel sounds taught by examples of them being given in many ways, so that in every word they are instantly recognized. There must, however, be no mental strain in learning what is necessary, it must be taken in slowly and gradually absorbed.

In stammerers of a severe type, the throat muscles are hard and tensed, and the tongue so drawn up at the back, that it is almost in contact with the soft palate; all this must be overcome before much improvement can be obtained. Stammerers are often given very bad advice; the worst is being told that speech will be made quite easy by taking a long deep breath, without explaining what correct breathing is. The long deep breath almost invariably results in the stammerer raising the upper chest, overloading the upper part of the lungs, and tensing the throat muscles; normal speech is thereby made an impossibility. If these efforts are persisted in, the stammer is made very much worse.

Stammerers vary very much in the type of their stammer, their demeanour, and sensitiveness. Generally speaking, the laryngeal type of stammerer, *i.e.*, the stammerer who has difficulty in producing the vowel sounds and voiced consonants, is more easily cured than the stammerer who rapidly repeats introducing consonants, and whose type of stammering is

known as stuttering. In practically all types, the treatment is both mental and physical, but, naturally, the need of either form, in particular, is more strongly indicated in some stammerers than in others. In some cases, the decided lack of control of the emotions is the exciting cause of the stammer; in others, the emotions are well under control, and the stammer is almost entirely of a physical nature.

It may be of interest to mention a few cases treated by this method.

(a) A young officer, whom I had previously successfully treated when he was a schoolboy, relapsed, after being twice wounded. His impediment was of the laryngeal type, and when spoken to he was often quite speechless. He was anxious to pass into the Regular Army from the Reserve of Officers, to which he was attached, but his stammer prevented it. I saw him nine times, and he improved so rapidly that he then applied for a medical board to have his speech tested. In spite of this trying ordeal, he came through it most successfully, and was passed into the first battalion of his regiment.

(b) An officer, a patient in Londonderry House, wounded on September 7 last, began to stammer within a few minutes of receiving his wound. I saw him on September 28, and gave him full instructions in breathing and vowel sounds. The stammer was of the laryngeal type, and there was also difficulty with the letter T. Unfortunately, he had to go away for special treatment in connection with his wound, but he wrote to me on October 23: "My speech has greatly improved, and, I may say, with the exception of a very slight stammer, is restored."

(c) An officer, a patient in Moray Lodge, was blown up by a shell on April 29. A stammer supervened. When first seen on November 8, his throat muscles tensed very much, and the breathing was very irregular. The speech was slow, and he checked very much on the voiced consonants. He is now practically normal in speech, and there is very seldom the slightest difficulty in speaking. He is still under treatment, but in a week or two will be completely cured. I asked him what had helped him most in his recovery, and he replied that it was the proper breathing, because he could always make himself quite quiet and free from anxiety when applying it.

(d) An officer, whom I had previously treated for a severe all-round stammer before the war, came and reported to me within the last fortnight that, although he had been through heavy fighting in France, and was in the Serbian retreat, he never had the smallest trace of a stammer.

(e) When in a ward at St. Bartholomew's Hospital, a few weeks ago, a private soldier asked to see me. He told me I had treated him for a stammer at the Hospital a few years ago, since when, and although he had been badly shot in the face during the war, there was not the

slightest evidence of his former impediment.

Aphasia.—The cases of aphasia that I have treated have nearly all exhibited a type of motor aphasia called aphemia, in which the faculties of hearing, writing, and reading, were normal, but speech was either practically non-existent or was only produced with great difficulty. The memory was, as a rule, rather defective, but not seriously so. These patients must be taught the same method of breathing as in stammering, and, as can be imagined, the correct breathing, with its calming effect on the emotions, has a great deal to do with recovery. The patient suffering from aphemia has a misconceived idea as to how voice is produced, and, consciously or sub-consciously, tries to get the voice by physical effort. When a sound is attempted, one notices his muscles are tensed everywhere, and that after he has with difficulty produced a simple sound or word, he is quite exhausted with the effort.

The treatment, therefore, is to get as complete muscular and mental relaxation as possible, to explain that voice is a matter of resonance in the head and chest, and only originates in the vocal cords, and then to start on the simple vowel sounds, which the patient generally produces in a few minutes. Then simple words like "sister," "nurse," and "good-night" are learnt. There comes a time, in some cases, when the patient has so far recovered from the original cause of his trouble that normal speech is really possible, if only relaxation of effort can occur. This accounts for the dramatic return of the speech of which one occasionally hears. The undue effort made sets up a hyperæmia of the brain, which is just sufficient to prevent speech being normal, and when the patient unconsciously relaxes this effort, he immediately speaks quite normally. This kind of recovery is not the normal course that this type of aphasia follows, and the recovery is generally steady and rather slow.

I would like to mention three cases which are, I hope, of interest.

(a) A private soldier, a patient in St. Bartholomew's Hospital, had been blown up by a shell, and when I saw him he was quite speechless. After explaining what I required him to do, he could, within a few minutes, produce vowel sounds with difficulty, and, as time went on, he was able to say a few simple words. I was told that he had asked, in writing, if he might have a tooth extracted, as he had

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one to two minutes. I repeat this, and at the same time place my left hand on the throat and gently squeeze on the back of the thyroid cartilage, asking the patient then to try to make the sound of AH on as deep a note as possible. If there are no vibrations, I tell him to cough, and as he coughs to finish the cough on the AH sound. The voice often returns immediately, but if it does not, I tell the patient to use a tongue spatula himself and to continue it assiduously until he can get vibrations, and until I see him again. The cure of functional aphonia is very much easier to accomplish in a long-standing case than in a recent case, and I would very much prefer to treat a case of six months' standing than one of six weeks. My strong belief is that for soldiers suffering from functional aphonia due to shock, the best method of treatment is at first complete rest in hospital, so that the general condition is improved; then for them to go to a convalescent home and to attend as out-patients at a hospital where the necessary treatment can be given.

The following cases of functional aphonia are typical:—

(a) A private soldier was sent to me at St. Bartholomew's Hospital, from the Minley Military Hospital, Farnborough, suffering from complete aphonia of some months' standing. I failed at the time to get the voice back, but I judged, from what I could hear in the larynx, that the voice would soon return. I saw the patient on a Thursday, and advised that, if my treatment be carried out regularly, the voice would return early in the next week. The Matron of the Hospital wrote to me as follows, shortly afterwards: "You asked me to let you know how Private B. got on after seeing you. I am very pleased to be able to tell you that his voice came back, by degrees, from that day, and, as you said, by the following Tuesday he could speak quite well, although in rather a high pitched voice but I think he has never really had a very deep one."

(b) An officer, who had been shot through the back of the neck on February 2, 1915, developed functional aphonia three weeks later. On May 18, of the same year, he was sent to me by Dr. Lambert Lack, who kindly asked me to treat him. I saw him twice; on the first occasion he got very definite vibrations. Four days later, the voice was full and resonant, and a week later he was able to sing in a deep bass voice.

(c) On December 13, 1916, an officer was sent to me from the hospital at 12, Belgrave Square, by Dr. Blackett, on the advice of Mr. Harold Barwell. He was completely aphonic, following acute laryngitis. I saw him in the morning, vibrations returned in a few minutes, and by four o'clock in the afternoon his voice was perfectly

read of recovery of speech in a similar case to his own, by such means. I assured him he could recover his speech without that operation. His general condition greatly improved, and I told him, after seeing him three times, that his speech would probably return immediately if he would get complete relaxation of effort. Shortly afterwards, when playing cards, he said: "that is my card," and from that moment his speech was quite normal.

(b) An officer in No. 1 London General Hospital was wounded under the left eye, on October 7, 1916. His speech became affected five days later, in a casualty clearing station. When I saw him on November 5, he spoke with very great difficulty, and was quite exhausted after saying a few words. I found that he, as in other similar cases, was tensing all his muscles as speech was attempted. I gave him advice as to breathing, and how to relax the abnormal efforts he was making. On November 12, he spoke with more freedom, and said to me "I am getting a bit better," and "I feel I must keep quiet, and it comes after a bit"; "I think far quicker than I can speak." I asked him what had helped him most, and he replied, it was the breathing. On the 15th, he spoke in rather a staccato voice, but his words did not check in the way they used to, and, on his discharge, about a week later, there was still further improvement, with the prospect of an early and complete recovery of his normal speech. (P.S.—I saw this patient again on January 17, his general condition and speech were both excellent.)

(c) The following is a case treated by a nurse who was present at a lecture I delivered in December 1915, and has kindly written me, spontaneously, about the case. Her letter says: "I have been ordered to treat several patients suffering from shell shock; one of them has been dumb for several weeks. . . . In all points your directions were followed implicitly. After four treatments, rather slow distinct voluntary speech was obtained. First, he made no sound, but breathed as directed; next came a grunt and vowel sounds, then consonants and short words, such as "bar," "see," "go," "do," "by." He said the words after me, with plenty of lip action, but could not do so unless I spoke first. Finally came a short sentence, uttered voluntarily. . . . There has been no return of the nervous condition since he resumed military duty."

Functional Aphonia is treated in various ways, chiefly by electricity. I always inform the patient what the condition of the cords is, and tell him how I want him to breathe as I attempt to get the voice back. I explain that in the aphonic condition the air from the lungs is being forced through a tensed throat and then articulated, whereas muscular relaxation and vibrations must be brought about instead. I then press down the back of the tongue with the two middle fingers of my right hand using a good deal of pressure, and hold the tongue in that position for from

one to two minutes. I repeat this, and at the same time place my left hand on the throat and gently squeeze on the back of the thyroid cartilage, asking the patient then to try to make the sound of AH on as deep a note as possible. If there are no vibrations, I tell him to cough, and as he coughs to finish the cough on the AH sound. The voice often returns immediately, but if it does not, I tell the patient to use a tongue spatula himself and to continue it assiduously until he can get vibrations, and until I see him again. The cure of functional aphonia is very much easier to accomplish in a long-standing case than in a recent case, and I would very much prefer to treat a case of six months' standing than one of six weeks. My strong belief is that for soldiers suffering from functional aphonia due to shock, the best method of treatment is at first complete rest in hospital, so that the general condition is improved; then for them to go to a convalescent home and to attend as out-patients at a hospital where the necessary treatment can be given.

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normal. On the following day, an almost identical result occurred in a patient at No. 1 London General Hospital, whom I treated there.

I will now describe a few cases of interest:—

(1) *Severe Injury to the Larynx and Vocal Cords.*—An officer, a patient in No. 1 London General Military Hospital, was shot through the throat, and the arytenoid cartilages destroyed, on August 24, 1916. Captain Ernest West, R.A.M.C., asked me to treat the case vocally, and has kindly supplied the following note on the case: "Lientenant J. Shrapnel wound of neck, involving larynx. Jagged piece of shell entered about tip of right greater cornu of hyoid, and passed downwards and to left through the larynx, lodging behind left lobe of thyroid. Larynx tilted to left, arytenoid region entirely replaced by scar, glottis fixed. Anteriorly composed of immobile bands of scar, stretching antero-posteriorly and webbed anteriorly; posteriorly a fixed irregular triangular gap, representing pars respiratoria. Voice a hoarse whisper only. After instruction, rapid alteration in voice and acquirement of a gruff voice, with plenty of tone in it, easily heard the length of a hospital ward. I consider the case a very striking success."

The treatment I gave was on exactly the same lines as that I use in cases of intrinsic cancer of the larynx, where, after operation, one cord or part of cord remains.¹ I developed the sterno-thyroid and sterno-hyoid muscles, and made the larynx sink in the throat. This action had the effect of relaxing what little of the cords was left, and vibrations occurred. These vibrations were amplified by the resonator positions of the vowel sounds being acquired and with the aid of very definite breathing.

(2) *A Case of Gunshot Wound of Hard and Soft Palates.*²—In this case, the patient had been shot through the throat on May 15, 1915, and the bullet had torn its way through the hard and soft palates, causing serious injury. The case was treated at the Croydon Military Hospital; the palates were most successfully repaired, and a most ingenious artificial velum fitted.

The speech, however, was very like that of a congenital cleft palate patient. The air was entering markedly into the nasal cavities, and the consonants "D" and "T" were affected, "CH" and "J" were very difficult of production, as were "S" and its combinations with "T," as in "strike," and with "P," as in

¹ See description of a case of intrinsic cancer of larynx (*Proceedings of the Royal Society of Medicine, Laryngological Section*, Vol. V, page 154, and Vol. VI, page 132).

² For full description of the treatment of the cleft palate speech, see chapter by C. MacMahon in Sir Arbuthnot Lane's new edition of "*Cleft Palate and Hard-Lip*."

"speak."

It will be noticed that the consonants affected were anterior linguo-palatals. I first got the back of the tongue to descend by use of a spatula, and then by training the sterno-thyroid and sterno-hyoid muscles to contract very strongly. Under normal conditions, the back of the tongue and the soft palate work in sympathy, and when the back of the tongue is high the soft palate is low, and *vice versa*. In this case, as the soft palate was contracted after repair it was unduly low, and the tongue correspondingly high. By sinking the back of the tongue and the floor of the mouth, the soft palate was elevated, and the over-supply of air was cut off from the nasal cavities. The cause of the weak production of the anterior linguo-palatal consonants, was, that the front part of the tongue was not free in its movement on account of its contracted condition at the back. When this was corrected, it soon resumed its normal functions, and the man spoke well. I must point out, however, that he was greatly helped by the artificial apparatus, which had been so successfully fitted at the hospital. A general rule in these cases is, therefore, to sink the back of the tongue and the floor of the mouth by developing the sterno-thyroid and sterno-hyoid muscles, and to re-educate the tongue in its movements where it has become deficient. In very severe cases, in which the roof of the mouth has been damaged beyond repair, I have noticed wonderfully good speech which has been entirely due to the fitting of obturators by dental surgeons.

(3) *A Case of Head Injury with Resulting Impairment of Speech.*—In this case, the patient had received a severe wound in the right eye, which necessitated the removal of the eye, and there was extensive bruising round the eye-socket; the upper lip was paralysed, the speech was very blurred, and, except for simple words, it was very difficult to follow. The "S," "K" and "G" were not present, and the speech, as a whole, resembled that of a person suffering from the effects of apoplexy. I saw him first on July 19, of this year, when I wrote out the main vowel sounds, and got him to repeat them after me. I then taught him to put the consonants in front and after them. In a week's time there was great improvement, and I then wrote out some verses for him to say, introducing the main vowel sounds. In a fortnight's time, he was speaking quite normally, except that the speech was rather slow; after a month, the speech was perfect.

NOTES ON THE OUTBREAK OF CEREBRO-
SPINAL FEVER AT READING 1915 TO 1916.

By ROBERT DONALDSON, M.A., M.B., CHB., F.R.C.S.E., D.P.H.

Pathologist to the Royal Berks Hospital, Reading, etc.

THE following notes are based on the epidemic of cerebro-spinal fever, which occurred among the civilian population of Reading during the year 1915-1916, and contain a reference to a slight outbreak which occurred at a certain boarding-school during the same period. The military cases, which occurred in Reading at that time, have not been included, but it may be stated that the disease first made its recognizable appearance among the civilian population.

Almost at the beginning of the Reading outbreak, the municipal authorities made arrangements whereby the general practitioners of the neighbourhood were enabled to obtain pathological assistance in order to confirm the clinical diagnosis, or to establish in doubtful cases a correct diagnosis based on bacteriological findings. In this way, practically all the cases came under my notice at some time or other in the course of the disease.

This action of the health authorities by placing the service of a pathologist at the disposal of the practitioners, without cost to the patients, enabled the doctors to have lumbar puncture performed on many slight cases which, in view of their indefinite symptoms, would otherwise have been regarded as influenza, or some such convenient disease.

In this way, many cases were declared positive, which would otherwise have escaped notification, and, indirectly, it was probably the means of yielding more accurate statistics as regards the mortality incidence. This has to be borne in mind, when we come to consider the Reading death-rate from this disease.

LUMBAR PUNCTURE.—TECHNIQUE.

In the majority of cases, this was done in the first instance without an anæsthetic.

At first I used, and recommended for use by others,

the type of lumbar puncture needle described by Dr. G. Scott-Williamson. As this needle has certain drawbacks, when used by one not accustomed to realize the need for careful collection of material for bacteriological investigation, I devised an improved form of needle, which has been fully described in the *Lancet*, December 9, 1916.

For the convenience of those who may not have been called on to perform lumbar puncture, the following directions may be given. The patient lies on his side, with the knees drawn up to the abdomen. The skin is cleansed with a suitable antiseptic. A convenient one is iodine, dissolved in ethylene dichloride, applied without previous washing with water.

That lumbar inter-space is chosen which lies on a line drawn between the highest points of the two iliac crests. The needle is made to pierce the skin in the middle line over this interspace, and is then pushed forwards in the direction of the umbilicus. In this way, the needle will be prevented from deflection to either side. It must be kept in mind as well that the intra-theal space is much further from the surface of the skin than anyone is apt to imagine, who has not performed lumbar puncture before.

The fluid is received through the lateral arm of the needle directly into a sterile bottle or into sterile nutrient broth. In the series of cases about to be considered, only a certain number were submitted to cultivation, largely owing to extreme pressure of work at the time, and to lack of adequate laboratory assistance. In the majority of cases, the centrifuged deposit was examined immediately at the laboratory, or after a night's incubation.

Examination of Contacts.—West's apparatus was used, but metal tubes were made to replace glass ones. Further, instead of the actual swab being composed of cotton wool, I employed bicycle valve rubber tubing, fixed to the end of the stilette. This will be found a great saving of time and of material for, with half a dozen such swabs, any number of men can be swabbed rapidly and expeditiously, by boiling each swab immediately after use in a portable sterilizer kept constantly boiling, and ringing the changes on the swabs so boiled. The rubber lasts for a considerable time without requiring renewal, and can be replaced easily

and rapidly when necessary.

Having withdrawn the charged swab from the nasopharynx, its tip was smeared over a tiny area of the medium on which it was purposed to observe the growth. With a sterile glass rod bent at right angles, the material so obtained from the swab was smeared over the plate, and what clung to the rod after so doing was smeared in turn over a second plate, both plates being removed as quickly as possible to the incubator.

It may be noted here that it is useless to send a swab, from a suspected contact, by post, since the slight drying that takes place is sufficient to kill any meningococci which may be present, and a negative result in such a case is of no value.

Culture Media.—In the majority of cases I used the egg-glucose-agar medium, devised by Miss Robertson at the Lister Institute. This I found to be highly satisfactory, quite as good as serum-legumen-agar and much more easily manipulated. In a few cases, I employed blood-glucose-agar, using fresh human blood for the purpose. In my opinion, the egg-glucose-agar or blood-agar is quite as good a medium as any on which to grow meningococci.

The plates were examined in 24 hours' time, and again, if necessary, in 48 hours' time. Suspicious colonies were then picked off and sown on glucose-egg or glucose-blood-agar. At the end of 24 hours, subcultures were made into sugars (1 per cent. of the various sugars in litmus peptone water), and these were incubated at 37° C. Another subculture was made at the same time, and incubated at 23° C. According to the sugar reactions and to the presence or absence of growth at 23° C., the organism was labelled meningococcus or otherwise. All pigment-producing organisms were rejected.

Owing to want of assistance, as already explained, no further attempt was made to differentiate the cultures thus obtained by serological methods. This, however, was kindly done in certain of the cases by Dr. Arkwright at the Lister Institute, who found that they fell into one or other of the groups prevalent during the epidemic in this country. Now, however, agglutinating sera against the four prevalent strains occurring during the epidemic can be obtained or, where

time permits, can be secured after animal inoculation, and all suspected meningococcal cultures should be subjected at once to the serological tests.

RESULTS.

The total number of civilians, on whom lumbar puncture was performed, was 68. Sixty of these were returned as cases of C.S. fever, one was doubtful, inasmuch as there were large numbers of pneumococci present, and it could not be reported definitely that the Gram-negative cocci present were meningococci in the absence of culture, while seven were suffering from diseases other than cerebro-spinal fever. It is, perhaps, worthy of mention that a positive carrier was found among the close contacts of the patient showing pneumococci in the C.S. fluid.

MORTALITY.

Out of 60 cases 24 proved fatal, *i.e.*, 40 per cent.

These cases have been arranged in tables, showing the percentage of fatal cases or of recoveries in age groups of decades.

TABLE I.—Shows Age Incidence of cases occurring in 1915.

Age Periods.	10 Years or under.	11 Years—20 Years.	21 Years—30 Years.	31 Years—40 Years.	41 Years—50 Years.	51 Years—60 Years.
Fatal cases = 19	8 cases or 42.1%	4 cases or 21%	3 cases or 15.7%	2 cases or 10.5%	2 cases or 10.5%	0
Recoveries = 36	7 cases or 19.4%	10 cases or 27.7%	6 cases or 16.6%	5 cases or 13.8%	5 cases or 13.8%	3 cases or 8.3%
Total = 55	15 cases or 27.2%	14 cases or 25.4%	9 cases or 16.3%	7 cases or 12.7%	7 cases or 12.7%	3 cases or 5.4%

TABLE II.—Shows Age Incidence of cases occurring in 1916 (first six months).

Fatal cases = 5	1 case or 20%	1 case or 20%	3 cases or 60%	0	0	0
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TABLE III.—Shows Age Incidence of cases occurring in 1915 and 1916 (first six months of latter).

Fatal cases = 24	9 cases or 37.5%	5 cases or 20.8%	6 cases or 25%	2 cases or 8.3%	2 cases or 8.3%	0
Recoveries = 36	7 cases or 19.4%	10 cases or 27.7%	6 cases or 16.6%	5 cases or 13.8%	5 cases or 13.8%	3 cases or 8.3%
Total = 60	16 cases or 26.6%	15 cases or 25%	12 cases or 20%	7 cases or 11.6%	7 cases or 11.6%	3 cases or 5%

TABLE IV.—Shows Age Incidence of cases occurring in 1915, cases in Age Groups of 20 years.

Age Groups.	Up to 20.	21-40.	41-60.
Fatal cases = 19 -	12 cases or 63.1 %	5 cases or 26.3 %	2 cases or 10.5 %
Recoveries = 36 -	17 cases or 47.2 %	11 cases or 30.5 %	8 cases or 22.2 %
Total = 55 -	29 cases or 52.7 %	16 cases or 20 %	10 cases or 18.1 %

It will be seen from these tables that the largest number of cases in any one decade of life occurred in children of 10 years of age or under, and over 50 per cent. of the cases occurred in persons of 20 years of age or under.

Further, in the 1915 series, nearly 50 per cent. of the fatal cases occurred in children 10 years of age or under, while in persons of 20 years of age or under the mortality was over 60 per cent.

It will be noted, therefore, that the disease was more common and more fatal in children and young adults, and with increasing age the cases were relatively fewer in number with a correspondingly diminished mortality.

The ages ranged from eight months to 56 years of age.

Sexes.—The sexes were almost equally affected.

SEASONAL INCIDENCE.

The cases, which occurred during 1915, were spread over the period extending from January to November. The greatest number occurring in any month was found in April, while 81.8 per cent. of the 55 cases occurred during the months of March, April, May and June, 1915.

The earliest case diagnosed as C.S. fever occurred in January of 1915 in a small boy, who recovered.

The largest number of fatalities in any one month took place in March.

Details of the Seasonal Incidence are set out in the

accompanying tables.

No. of cases occurring in each month of 1915.

—	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Fatal - -	1	2	7	3	3	0	1	0	0	1	1	0
Recoveries -	1	0	5	10	7	10	1	0	1	1	0	0
Total -	2	2	12	13	10	10	2	0	1	2	1	0

No. of cases occurring in each of first six months of 1916.

Fatal - -	0	1	0	4	0	0						
Recoveries -	0	0	0	0	0	0						
Total -	0	1	0	4	0	0						

METEOROLOGICAL CONDITIONS.

I am not in possession of detailed statistics relating to the weather conditions. The winter and spring of 1915 were particularly wet and cold, and much of the surrounding district was frequently under water. With the advent of hot weather, the cases became very much fewer in number, although they did not entirely disappear. The drop was more or less sudden, for, whereas in June, ten civilian cases were notified, in July there were only two, and in August, none.

The meteorological conditions certainly predisposed the population to catarrhal affections of the throat and larynx, and, during the first part of the year, affections of this nature were extremely prevalent.

OVERCROWDING AND ENVIRONMENT.

The cases occurring among the civilian population were found mostly in the poorer districts, towards the West End of the town, especially among the labouring and mechanic classes. Some of the houses were little better than slum property. Many were extremely dirty, ill-ventilated, or not ventilated at all, and generally overcrowded. There were one or two exceptions, notably those which occurred at the boarding-school referred to further on, where boys belonging to the better classes of society were living under the most hygienic

TABLE IV.—Shows Age Incidence of cases occurring in 1915, cases in Age Groups of 20 years.

Age Groups.	Up to 20.	21-40.	41-60.
Fatal cases = 19 - - {	12 cases or 63.1 %	5 cases or 26.3 %	2 cases or 10.5 %
Recoveries = 36 - - {	17 cases or 47.2 %	11 cases or 30.5 %	8 cases or 22.2 %
Total = 55 - - {	29 cases or 52.7 %	16 cases or 20 %	10 cases or 18.1 %

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same family inhabiting each affected.

The shortest interval elapsing between the two cases in any one house was three days.

The particulars are set out in the following table.

—	House I.	House II.	House III.	House IV.
1st person - - -	March 11†	March 15†	April 11	June 27
2nd person - - -	May 13†	June 5	April 17	June 30
Interval between onset of each case.	63 days	82 days	6 days	3 days
Interval between death of one and onset in the other.	41 days	11 days	—	—

OCCUPATION.

This appears to exercise no particular effect on the incidence of the disease. Apart from those of school-age, the majority certainly followed occupations which kept them more or less indoors, in the house or the workroom. The minority worked in the open air.

ORIGIN OF THE DISEASE.

There is no definitely positive information forthcoming on this point. The majority appeared to arise without any obvious connection with a known previous case or with a known carrier.

There are one or two possible exceptions. Among these should be included, perhaps, those instances where two cases occurred in each of three houses respectively. One member of one of those households was taken ill on April 11. Six days later, the rest of the family of 12 were examined as to the possibility of their being carriers. Four of them turned out to be carriers, one of whom was herself taken ill with C.S. fever within a few hours of being swabbed. Assuming that she caught the infection from her brother, which lacks proof, the longest incubation period in this case would be six days. None of the other members of that family developed the disease.

In another instance, the mother, the manageress of a hotel, was taken ill with C.S. fever, and three days later her

† Termination by death.

conditions and indeed, were practically living in the open air.

While the disease appears, therefore, more prevalent in the dirty, ill-ventilated, and frequently overcrowded houses of the poorer sections of the community, it is by no means confined to them, and may appear amongst persons living almost in the open air, and under excellent sanitary conditions.

Distribution of the Cases.—The cases occurred, as already mentioned, in the poorer districts of the town, and for the most part indiscriminately.

Of 55 cases whose address I possess, 45 occurred in the town of Reading, five in Caversham, which is practically part of Reading, and five in the country districts in the immediate vicinity.

In only five streets were two different houses attacked in each.

The shortest possible interval elapsing between the two cases in any one street was ten days, and the longest, one year, so that any very definite connection between the cases is not easily demonstrable.

The particulars are set out in the following tables.

—	Street I.		Street II.		Street III.		Street IV.	
	Onset.	Termination.	Onset.	Termination.	Onset.	Termination.	Onset.	Termination.
House I. -	Mar. 21	May 22	Apr. 23	June 24	Apr. 29	June 3	Apr. 30	May 29
House II. -	Apr. 1	Aug. 12	July 6	July 18†	May 27	June 30	Feb. 10 1916.	Feb. 19 1916.
Shortest possible interval.	11 days from onset of one case to onset of other.		12 days from discharge of one case to onset of 2nd.		28 days.		Over a year.	

—	Street V.		
	Onset.	Termination.	
House I. -	March 19	March 29†	} = Shortest interval = 10 days. } = Shortest interval = about five months.
House II. -	March 29	May 10	
House III. -	Oct. 1	Oct. 6	

In only four different houses were two members of the

† Termination by death.

from onset till death was 12.2 days.

Duration of Illness in the Cases which Recovered.—The average time elapsing from onset till discharge from hospital was 44.1 days.

Previous Health of the Patients.—With the exception of the case already mentioned as having had chicken-pox immediately before C.S. fever developed, and another who was stated to be slightly phthisical, all the others had previously been in good health. Many gave a history of having had scarlet fever, measles, or whooping cough in childhood. One or two had had pneumonia, and one had had what was stated to be rheumatic fever. Only one had ever suffered from diphtheria, while six had been subject to occasional attacks of "sore throat."

ANALYSIS OF SYMPTOMS.

		Present.	Absent.	Unrecorded.
Headache	- - - - -	48	1	11
	(In 39 this was the first symptom.)			
Sickness	- - - - -	45	—	15
Rigors	- - - - -	13	—	47
	(In 9 this was the first symptom.)			
Sore throat	- - - - -	7	53	—
	(In 2 this was the first symptom.)			
Stiffness of neck	- - - - -	43	8	9
Head retraction	- - - - -	15	7	38
Herpes	- - - - -	12	48	—
Rashes	- - - - -	18	—	42
	(9 of those with rashes recovered.)			
Kernig's sign	- - - - -	57	—	3
	(Kernig's sign was present in varying degree.)			
General pains	- - - - -	30	—	30
Incontinence	- - - - -	10	—	—
Retention	- - - - -	2	—	—
Polyuria	- - - - -	4	—	—
Diarrhoea	- - - - -	5	—	—
Hæmatemesis	- - - - -	1	—	—
Facial paralysis	- - - - -	1	—	—
Double strabismus	- - - - -	2	—	—
Double optic neuritis	- - - - -	1	—	—
Acute mania	- - - - -	1	—	—
	(Recovery after being in asylum.)			

son, a small boy, became ill of the same disease. Assuming again that the child caught the disease from the mother, the interval between symptoms showing in the mother and the child was three days.

In the third instance, the first person whose husband, by the way, was a soldier, took ill and died 77 days later (of hydrocephalus), during the whole of which time she was in hospital. A sister, who lived some miles away, came home for the funeral, and she herself developed the disease 11 days later. In this case, the longest incubation period apparently was 11 days, assuming that the second person contracted the disease on her temporary return home.

In the fourth instance, one member of a family, who yielded two carriers, died of C.S. meningitis. Sixty-three days from the time the disease made its appearance in the first case, another member of the family was taken ill and died. This period, however, has little value, for the second member of the family had been ill more or less during these 63 days with what the medical attendant called chicken-pox, and was in a very debilitated condition when seen by me.

The only other cases which might be presumed to have some connection with one another, were those occurring in the same street, but in different houses as already detailed. In three of those instances the interval varied from 10 to 12 days between the appearance of symptoms in the two people attacked. I know of no direct connection, however, between the cases occurring in the same street, and in all probability the occurrence was a mere coincidence.

Incubation Period.—Reference has been made to this, so far as I have been able to ascertain it, in the above paragraph, and so far as can be deduced from the small number of cases, varies between three and 12 days.

Severity of the Cases.—Of the 60 civilian cases, 34 were of a severe type, and of this number 24 died. Four were moderately severe, while the remaining 22 were comparatively mild. The large proportion of mild cases, as already suggested, was probably partly due to the fact that facilities for pathological examination were offered gratis to the general practitioners, and many cases were diagnosed that otherwise would have gone unrecognized.

Duration of Illness in the Fatal Cases.—The average time

from onset till death was 12·2 days.

Duration of Illness in the Cases which Recovered.—The average time elapsing from onset till discharge from hospital was 44·1 days.

Previous Health of the Patients.—With the exception of the case already mentioned as having had chicken-pox immediately before C.S. fever developed, and another who was stated to be slightly phthisical, all the others had previously been in good health. Many gave a history of having had scarlet fever, measles, or whooping cough in childhood. One or two had had pneumonia, and one had had what was stated to be rheumatic fever. Only one had ever suffered from diphtheria, while six had been subject to occasional attacks of "sore throat."

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Diarrhœa	- - - - -	5	—	—
Hæmatemesis	- - - - -	1	—	—
Facial paralysis	- - - - -	1	—	—
Double strabismus	- - - - -	2	—	—
Double optic neuritis	- - - - -	1	—	—
Acute mania	- - - - -	1	—	—
	(Recovery after being in asylum.)			

	Present.	Absent.	Unrecorded.
Acute hydrocephalus - - -	1	—	—
Other mental affections - - -	31	—	—

(These include coma, delirium, etc., and of that number 23 ended fatally.)

Pulmonary complications - -	6	—	—
(3 of these ended fatally.)			

Cardiac bruits - - - -	4	—	—
Nasal discharge - - - -	1	—	—
Otorrhœa - - - -	2	—	—
Deafness - - - -	2	—	—

(Coming on shortly before death.)

General tremors - - - -	2	—	—
Serum rashes - - - -	7	—	—

Hence, from the above figures, if we regard for the time being those cases as not showing a given symptom, in which no note of the presence or absence of that symptom has been made, we find the following figures relating to the chief signs or symptoms in the whole series of 60 cases.

Kernig's sign - - -	present in	95 per cent.	of the series.
Headache - - -	"	80	" "
Sickness - - -	"	75	" "
Stiffness of neck - - -	"	73	" "
Mental derangements - - -	"	51	" "
General pains - - -	"	50	" "
Rashes - - -	"	30	" "
Herpes - - -	"	20	" "
Head retraction - - -	"	25	" "
Incontinence - - -	"	16	" "
Sore throat - - -	"	11	" "
Rigors - - -	"	21	" "

The above percentages for headache, sickness, rigors, stiffness of neck, head retraction, rashes, incontinence, and Kernig's sign, are all probably slightly underestimated, inasmuch as where those symptoms or signs have been unrecorded, they have been reckoned as absent.

The constancy of Kernig's sign is to be noted.

In view of the great prevalence of sore throats during the winter of 1915, the relatively small percentage, viz., 11 per cent., among the above recorded cases is noteworthy. There is, therefore, apparently very little connection, to judge

CEREBRO-SPINAL FEVER AT READING. 447

from these cases, between sore throat and C.S. fever.
 A more remarkable feature was the presence of agglu-
 for *B. typhosus* in the blood, or of the patients.
 some methods of dealing with these were
 and opacchari - - - but throats,
 Aquæ - - - - - insufficient
 Misce. Fiat mistura.

"One to two tablespoonfuls to be taken every day."

III. *Sulphur*.—This cannot be given *au naturel*, as in diseases of the alimentary canal. If necessary, sulphuretted hydrogen may be used. Although a poison when breathed, it can be swallowed without inconvenience as in certain mineral waters. For medical purposes the preparation usually employed is thiosulphate of soda, commonly called hyposulphite of soda. It is an excellent remedy in foetid bronchitis.

R.	Sodii Hyposulphitis	-	-	-	3i.
	Syrupi Eucalypti	-	-	-	3x.
	Aquæ Tiliae	-	-	-	3xx.
	Misce.	Fiat mistura.			

"To be taken in tablespoonful doses through the day."

Long drawn-out cases of chronic bronchitis should be sent in the best time of year for a course of sulphurous waters. Of these there are two main classes, the waters of the Pyrenees, which come from the depths of the earth, and those of Enghien, which are surface waters.—(*Journ. des Praticiens*, 18 December, 1915.)

TREATMENT OF TINEA TONSURANS.

For superficial cases of this affection, Sainger has obtained good results from the use of tincture of iodine and the following ointment:—

R.	Acidi Salicylici	-	-	-	3ij.
	β Naphtholis	-	-	-	gr. lxxv.
	Resorcini	-	-	-	3i.
	Adipis Lanæ hydrosi	-	-	-	ad 3iij.
	Misce.	Fiat unguentum.			

This ointment is spread on a piece of gauze, which is then applied over the affected area, and kept in position with a bandage. It is left in place for 24 hours. Any blebs found on removal are opened, and an inert dusting-powder is applied to the area. The patch will usually be found to have disappeared completely by the following day.—(*New York Med. Journ.*, 4 December 1915.)

THE PRACTITIONER.

Acute hydrocephalus	Present.	Absent.	Unreco
Other mental affe			

(These included by Sir E. A. SCHÄFER, JOHN NGTON

H. BRYCE. Eleventh edition. Vol. II., Part I. *Splanchnology*. By J. SYMINGTON, M.D., F.R.S. London: Longmans, Green & Co.

THIS volume of the now famous anatomy deals with the digestive, respiratory, and genito-urinary systems, and with the ductless glands. It is in the section devoted to some of the members of the endocrinic system that the reader will look for something new. If he does not find very much that is altogether new, he will at any rate find what is true, set forth with commendable clarity, and accompanied by excellent illustrations. The curious will wonder why our old and honoured friend the spleen should now appear as the "lien or spleen," but his wonder will not prevent him from admiring the descriptions, verbal and pictorial, of this viscus and its neighbours in the abdominal cavity. It is with much regret that we realize the absence of any notice either of the pituitary or the pineal from the volume, for we thought ourselves in the kingdom of the ductless glands, whereas in reality we were floundering about in the splanchnic lake. A change of arrangement by which all the ductless glands could appear together in one volume would be an advantage. We have taken down from our shelves two well-thumbed volumes, which constituted the eighth edition of "Quain's Anatomy," in order to compare with the present issue, the portions which cover the same ground. And it is really surprising to find that though there are modifications, there are no very serious alterations. "Quain's Anatomy" has now established for itself a position of pre-eminence as a work of reference and as a standard of accuracy, which is unlikely ever to be challenged. Certainly no challenge is likely to be successful, so long as the work is maintained at its present level. It has attained to cabinet rank, and, on the showing of the present volume, it thoroughly deserves its success.

War Surgery. By EDMOND DELORME, Médecin Inspecteur Général de l'Armée. Translated by H. DE MÉRIC, Surgeon to In-patients, French Hospital, London. Pp. 242. London: H. K. Lewis & Co., Ltd.

At the present time, much interest must centre around works which deal with experiences gained in the treatment of wounds and injuries caused in modern warfare. This little book, written by the eminent French Surgeon General, will be widely studied. It has a special claim, in that it embodies studies collected by various observers in the most recent wars, including, to some extent, that which is now raging. Great care is expended in describing the

From these cases, between sore throat and C.S. fever. A more remarkable feature was the presence of agglutination for *B. typhosus* in the blood, or of the patients. Some methods of dealing with compound fractures these were given, and one or two pieces of apparatus figured; but the notes, is dealt with in a manner which is far too brief and insufficiently illustrated.

The types of injury to blood vessels are well described, but the important subject of Arterio-venous communications, especially from the point of view of treatment, is very incomplete.

The various infective processes are described in a short chapter, and, here, again, treatment might well be more fully given, and the experiences obtained with vaccines and serums described.

Indications for amputation are given in Chapter XI., but few details are included.

Wounds of the chest and abdomen, of the skull and sense organs, are briefly but well described, and the reader is strongly warned against hasty operative interference. However, the book contains a deal of useful information, and, on the whole, the translation does great credit to the translator; though, in some places, his endeavour to put the idiomatic French into English renders it necessary to re-read the paragraph more than once, to obtain a clear grip of its meaning.

In many cases brief statistics are given, and may prove useful guides, especially for prognosis. The whole book is nicely got up, well printed, and of convenient size, and is likely to supply a much felt want during the war.

Local Anæsthesia: Its Scientific Basis and Practical Use. By Professor H. BRAUN. Translated and edited by PERCY SHIELDS, M.D. Pp. 399 with 215 illustrations. Cincinnati, Ohio London: Henry Kimpton. 21s. net.

THIS book may fairly be regarded as one of the most thorough and authoritative expositions of the practice and principles of local anæsthesia available. It is well printed and freely furnished with clear diagrams and detailed illustrations, so that it is invaluable to one who is beginning the practice of operations under local analgesia. The different local anæsthetic agents are elaborately discussed and the different ways of using them accurately are fully described. The agents preferred are novocaine and alypine, with stovaine and tropacocaine for spinal analgesia. Stovaine, Braun declares, may cause injury to the tissues even in a dilution of 1 per cent. The author is emphatic that any local agent to be satisfactory must be compatible with the concurrent use of adrenalin. A chapter is devoted to the consideration of the influence which the vitality of the tissues affected bears upon the

Acute hydrocephalus

Other mental affect-y work dealing w

Present. Absent. Unrec-
ed

(These incl. and as such undoubtedly in two parts, the first dealing with general considera-

Pulm. the application of electricity in medicine, and the second
not X-rays. The descriptions of apparatus and its managemente-clear and satisfactory. The method recommended in X-ray
ork would be quite satisfactory for the radiography of bones or foreign
odies in the limbs, but that they are insufficient for the difficult work
required from the modern radiographer is shown by the statement
that "the normal kidney can seldom be demonstrated." We venture
to say that, if a radiographer cannot demonstrate at any rate the lower
pole of the normal kidney in the majority of his cases, he is not up to
modern requirements in his work. However, there are many installa-
tions in use, especially at the present time, when a number of temporary
outfits have been set up, to which Dr. Norman's remarks are quite
applicable, and there is no doubt that a study of this book will be of
great advantage to the beginner in the study of electro-therapeutics.

A Text-book on Radiology. By EDWARD REGINALD MORTON, M.D.,
C.M. (Trin. Tor.), F.R.C.S. Pp. 221. London: Henry Kimpton.
7s. 6d. net.

"No book can take the place of practical experience and demonstration in a hospital department, and he who undertakes X-ray therapeutics without this training must expect disappointment, even if he is fortunate enough to escape disaster." With this most apposite remark does this excellent little manual conclude, and we can only add that the same applies to X-ray diagnosis. The presentation of the subject in a readable form will especially appeal to those commencing the study of radiology, and that the author at times should be a little dogmatic is rather an advantage for them. A certain number of errors have crept in, and physics do not seem to be the author's strong point. To recommend a German atlas of the normal and make no mention of the excellent and more complete English atlas (by Ironside Bruce), seems to be an error of judgement at any time, particularly at the present. The author prefers to examine his negatives wet, and states that slight differences in density are then more marked. Many radiologists, however, believe the reverse. The illustrations reach a high standard, and a couple of lateral views of the stomach are figured; in one case, this gives information not deducible from the anterior view. A lucid but brief description is given of the apparatus employed, the illustrations to this being mostly original and not taken from maker's catalogues. It is refreshing to find that absolute immobilization of the part to be radiographed is insisted on, and that the breathing must be suspended during the exposure

these cases, between sore throat and C.S. fever. more remarkable feature was the presence of agglutination in the blood of some of the patients. It is recommended in filtered ray application; many will, however, prefer to measure the rays before they are filtered, using a tube of some of the procedure equally easy. The necessity for post-operative lactic treatment of carcinoma is pointed out, and it is stated that immediate post-operative treatment definitely increases the patient's chance of complete recovery.

On the whole, the student who follows carefully the methods described, both in radiography and radiotherapy, will establish for himself a good groundwork on which to build subsequently.

Swanzy's Handbook of the Diseases of the Eye and their Treatment.
 Edited by Dr. LOUIS WERNER. Eleventh edition. Pp. xviii + 646. 9 coloured plates and 261 text illustrations. Size, Demy 8vo. London: H. K. Lewis & Co., Ltd. 12s. 6d. net.

OWING to the lamented death of Sir Henry Swanzy, Dr. Louis Werner is solely responsible for the present edition of this well-known handbook, and he has fully maintained its excellence. He collaborated in the preparation of previous editions, and to him are due the well-executed coloured plates, which were first introduced in the tenth edition. Whilst avoiding any alteration in the general plan and character of the book, Dr. Werner has revised it thoroughly, incorporated much new matter, and added many illustrations without appreciably increasing the number of pages. The chapter on the Pupil, which was omitted in the last edition, has happily been restored. The subject of Nystagmus has been brought up to date, and amplified to include vestibular Nystagmus. In the chapter on Glaucoma, Schiötz's Tonometer is described and illustrated, as well as the latest operations. The chapter on Retinal Diseases contains important new matter, whilst there are many minor additions elsewhere. As stated in the text, "it is now almost universally admitted that Holmgren's coloured wool test is inadequate as an efficient test," and in accordance with this the well-known card of coloured wools at the end of the book, explanatory of Holmgren's Tests for Colour Blindness, is for the first time omitted.

There is no handbook on Ophthalmic Diseases which can be more strongly recommended to the student and practitioner. With its excellent arrangement, clear type, abundant illustrations, and concise but ample information, there is no wonder that the eleventh edition has now been reached, and there is no doubt that in Dr. Werner's hands it will continue to merit the wide popularity which it has hitherto enjoyed.

Acute hydrocephalus Present. Absent. Unrec-
Other mental affect: ~~ed.~~ ^I ~~ed.~~ ^I
(These incl. 79, Queen Victoria Street, E.C.)

It combines 75 per cent. of the purest liquid paraffin with the of malt and pure English honey. It is intended for use in the treatment of constipation after operations, and in delicate constitutions, as well as in children. It is of the consistency and colour of honey, and has a pleasant sweet fragrance. These properties enable it to be taken much more easily and readily than the ordinary liquid paraffin, the oiliness of which is insuperably repugnant to many people. It is not surprising, therefore, to find that the preparation is meeting with every success.

"TABLOID" SODIUM ACID SULPHATE.

(London: Messrs. Burroughs Wellcome and Company,
Snow Hill Buildings, E.C.)

This preparation offers a handy and speedy method for the purification of drinking-water. It is a prime necessity that some means should always be ready at hand for the soldiers to carry out this vital safeguard. Bodies of troops on detached duty, especially cavalry, will frequently be out of reach of the supply furnished by the highly efficient water sterilizers now in use. It has been found that the addition of bisulphate of soda to water renders it sufficiently sterile for all practical purposes. This salt decomposes when dissolved in water, and yields 40 per cent. of its weight of sulphuric acid. The addition of one "tabloid" to a pint of water, or two to a service water-bottle which contains nearly two pints, yields sufficient free acid to render harmless within half-an-hour most of the pathogenic organisms present. The flavouring and sweetening of the tabloids serve to mask the acid taste to a large extent, and the water acquires a flavour very like lemonade. The tabloids must not be used in water-bottles made of iron, nickel, german-silver, white metal, britannia metal, or any alloy of copper. Aluminium is the most suitable metal for the purpose. The tabloids are issued in bottles of 50.

LYCRYL.

(London: Eucryl, Ltd., 61-63, Lant Street, Southwark, S.E.)

This product, designed to take the place of lysol, contains a high percentage of free cresols in a soapy fluid. It mixes well with water, and is used in half or one per cent. solution for general surgical purposes. The cresols used in its preparation have been freed from those which have a corrosive effect on the skin, and an irritant action on the tissues. The soap used has good detergent properties.

from these cases, between sore throat and C.S. fever.

A more remarkable feature was the presence of agglutinins for *B. typhosus* in the blood of some of the patients. In 11 instances, the blood was examined for the presence of typhoid agglutinins, and in five instances these were present. Three of the five showed definite typhoid spots, while two of them had a typhoid-like diarrhoea, and one of those two evidently had a hæmorrhage, this last case proving fatal. None of these five cases had had typhoid previously.

The presence of typhoid agglutinins has been observed before by other workers, in the blood of patients suffering from C.S. fever. I offer no explanation, beyond the suggestion that when attacked by the meningococcus, a patient is liable to become infected with some other type of pathogenic organism which may be lurking about his body.

Another feature worthy of note is the very small percentage of those who recovered from the disease who were left with after effects in the shape of heart murmurs, etc.

Temperature during the Attack = 101.6° C.

Pulse-Rate during the Attack = 79.8 per minute.

It is seen that the pulse is slightly slower than one would expect it to be relatively to the temperature. In many cases, the pulse-rate was higher than that mentioned above, but there is a tendency for the pulse to be somewhat slower relatively to the increase in temperature, a feature of much significance, so far as the prognosis is concerned.

Examinations were made in six cases at intervals varying from the fourth to the eighth day of the disease. In all these cases, the pulse-rate was normal. There was no leucocytosis of the neutrophil type present in the cases examined, the highest count was over 20,000, the highest being the average was 19,520.

The diagnosis was established in all these cases by lumbar puncture; this puncture was also resorted to in the most severe cases.

ber

those who

recovered = 2.6.

The actual numbers are set out in the following table.

No. of punctures -	1	2	3	5	6	8	22
No. of patients so punctured.	22	4	4	1	2	2	1

The average number of punctures made on the fatal cases = 3.7.

Details of those punctures are set out in the following table.

No. of punctures -	1	2	3	4	5	6	7	8	9	10
No. of patients so punctured.	5	6	4	1	2	1	2	0	2	1

The greatest number of times any one person was punctured was 22, and the total amount of fluid drawn off from this person was 860 cc.

It will be noticed that the fatal cases were punctured relatively more often than the cases which recovered, although the average duration of life after the disease began in those cases which proved fatal was 12.2 days. On the other hand, the cases which recovered were obviously less severe, and in the opinion of the medical attendant in charge of them, required less in the way of lumbar puncture.

It seems a legitimate deduction to make, that even in the absence of a known curative serum, there are many cases which will get well even without lumbar puncture, or after one puncture only: witness the 22 cases which recovered after one puncture. If this be true, it follows that many of the slighter examples of C.S. fever are probably wrongly diagnosed, get better without having been punctured, and so escape notice. For this reason, also, statistical returns probably underestimate the real incidence of the epidemic.

It seems equally legitimate to claim that in the absence of a curative serum, the bulk of the very severe cases will die in spite of lumbar puncture. There is a possible fallacy here, for in very severe cases especially, it appears to be essential to resort to *early lumbar puncture*, and to *repeat* the

operation much more frequently than has been done in the above cases.

Average Amount of C.S. Fluid withdrawn on each occasion.—The average amount withdrawn at each puncture varied between 35 and 40 cc.

It was always under pressure, meaning by that the fluid escaped not in mere drops, but in a steady flow; in some cases even spurting out for a considerable distance.

Character of the C.S. Fluid.—In 32 of the cases, I have notes of the naked-eye character of the C.S. fluid. In 18 of those it was turbid or purulent, while in the remaining 15 it was quite clear. Out of 32 cases, therefore, 56.2 per cent. were turbid or purulent, while 43.7 per cent. were quite clear.

As the remainder of the series, amounting to 28 in number, were for the most part mild cases, the above figure representing the percentage number of turbid fluids would probably have to be slightly reduced, while the percentage of clear fluids would be slightly increased in a corresponding ratio. It would probably be nearer the truth to say that the number of turbid fluids was about equal to the number of clear fluids in the Reading series of cases.

Microscopical.—In the case of the turbid fluids, pus cells were easily found, and the degree of turbidity depended, as a rule, on the numbers of pus cells present. These, for the most part, consisted of polymorph leucocytes, but there were generally present as well, lymphocytes and endothelial cells. In films made from such fluids, it was fairly easy, as a rule, to find intra-cellular forms of the diplococcus.

In the case of the clear fluids, leucocytes were practically absent, except where a drop of blood had gained entrance to the fluid at the time of puncture, and in some of those clear fluids much searching was necessary before Gram-negative diplococci could be found.

Presence of Organisms other than the Meningococcus in C.S. Fluid.—While no case was reported positive, in which meningococci or organisms of similar morphology and staining properties were not found, many of the films and cultures showed the presence of other organisms. In some cases, these latter were undoubtedly due to contamination of the fluid during its collection, especially when the fluid was collected by one not quite familiar with bacteriological

methods. It was with the object of reducing this risk to a minimum, that I have suggested the new form of needle already referred to.

Apart from organisms implying extraneous introduction, there were others obtained from fluids where the possibility of outside contamination had been eliminated as far as possible. These were of a diphtheroid nature, and have already been described by me in a previous paper.¹ Since then, some degree of confirmation of the view that these diphtheroids are not to be regarded as derived from extraneous sources has been forthcoming from other bacteriologists, who have encountered similar organisms in fluids under circumstances which practically excluded outside contamination.

For various reasons, I suggested in the paper above referred to, that such diphtheroids were probably specifically related to the meningococci, which latter I regarded as one phase in the life history of the diphtheroid. Since then, I have carried out further observations on this possible relationship, with the result that I have modified my former view, and have come to look on the diphtheroid entirely as a secondary invader. These observations have been embodied in a communication which has been submitted for publication.

The one organism common to all cases of C.S. fever is one or other of the various strains of meningococcus. This, though now generally accepted as the causal agent, does not necessarily represent the true bacterial content of every C.S. fluid. In a certain number, other organisms may be present, which may conveniently be placed in one or other of two groups. They may be merely contaminating organisms which have gained entrance to the specimen through faulty technique. Where, however, care has been taken to exclude such possible contamination, they must be looked upon as secondary invaders, which, for some reason, have gained entrance to the spinal fluid or the blood, and to this class the above mentioned diphtheroids probably belong.

TREATMENT.

The majority of the series of 60 cases had serum given intra-theccally, at some time or other during the course of

¹ *Lancet*, June 26, 1915.

the disease. Many were given an injection of serum after each withdrawal of C.S. fluid. All the various brands of serum obtainable at the time were tried, without any apparent effect on the temperature or on the course of the disease.

Two cases, after receiving three and six injections of serum respectively, were given 24,000 units of anti-diphtheria serum. One of these cases was also suffering from pneumonia and pleurisy, while the other was in a state of acute mania. Both ultimately recovered. In one of these cases, the temperature, which had remained uninfluenced by the anti-meningococcal serum, came down after the administration of the anti-diphtheritic serum.

Two cases were treated with Soamin, as well as with anti-meningococcal serum. One of these, however, was moribund before treatment was begun. The other was punctured 22 times in all, and had serum on each occasion. This patient was also given eight 1-grain doses of Soamin. No appreciable effect could be attributed to one or other of the remedies employed.

In the civilian cases, therefore, administration of the various brands of anti-meningococcal serum then available appeared to have no effect whatever. In other words, they proved a failure.

From a consideration of the cases which came under my notice, I am of opinion that early and repeated lumbar puncture in the absence of a serum of known curative value, is of more importance than any other method of treatment. The beneficial effects of simple lumbar puncture, apart from mere relief of pressure, are, I would venture to suggest, due to the mechanical flushing action which must occur in the cerebro-spinal system, when a large quantity of cerebro-spinal fluid is suddenly removed from that system. I consider this physical action of the greatest importance, in so far as the flushing must bring with it fresh bactericidal substances and fresh leucocytes to replace the exhausted contents of the thecal sheath.

Apart from this, it remains to be seen whether the serum now on the market, made from virulent strains of the various types isolated during the 1915 epidemic, will be more efficacious than those which have so signally failed. I might suggest an attack on the disease by direct irrigation of the spinal meningitis by an antiseptic, *e.g.*, flavine, or by the

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reported negative on the third occasion. The average interval between the first and second swabbing, during which time they must have been carriers, was 35.5 days. The average interval between the second swabbing and the third, when they were reported negative, was 32.1 days.

Two were swabbed on four occasions, and were only returned as negative on the fourth occasion. The interval between the first and third swabbings, during which time they must have been carriers, was 40 days. The interval between the third and fourth swabbing, during which time presumably they became free, was 22 days.

Proportion of Carriers found in relation to Fatal and Non-Fatal Cases respectively.—Of the 25 fatal cases, the contacts of 14 were swabbed, amounting to 107 in all. Thirteen per cent. of those in contact with those 14 fatal cases were found to be carriers.

Among the contacts of four of these 14 fatal cases of the disease, no carrier was found.

The persons, numbering 168, who were in contact with the 36 cases which recovered, yielded 18 carriers, or 10.7 per cent. of the contacts of the non-fatal cases.

Of 32 positive carriers, 45.6 per cent. had been in contact with fatal cases of the disease. This percentage is really much higher than it appears when we remember that the proportion of fatal to non-fatal cases was 2 to 3.

Seasonal Incidence in relation to Carriers.—This of course is intimately bound up with the seasonal incidence of actual cases of the disease. The months, with the number of carriers found in each, are set out in the accompanying table.

Month.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
No. of carriers	0	1	10	13	7	0	1	0	0	0	0	0

Age Incidence of Carriers.—Twenty-one out of the 32 were 20 years of age or under, while the remaining 11 were over 20 years of age.

Contacts found Carriers who subsequently developed the Disease.—In only one civilian case did a contact who had been found to be a carrier develop the disease. This was the second member of the same family to fall a victim to C.S. fever.

Carriers among those in attendance on actual Cases.—In

administration subcutaneously of fresh leucocytic extract as a stimulus to further leucocyte production.

Cases which showed no Meningococci after Examination of C.S. Fluid.—Seven cases suspected of C.S. fever were punctured, and an examination of the fluid so obtained failed to prove the presence of meningococci. One had no symptoms of meningitis when seen, and the C.S. fluid was absolutely normal in every way. Two contained large numbers of pneumococci in the C.S. fluid. Both died, and were reported as cases of pneumococcal meningitis. One case showed the presence of streptococci in the fluid, and at the post-mortem septic pneumonia was found. Two cases yielded tubercle bacilli on examination of the C.S. fluid, and both died. Another which failed to show the presence of meningococci I have been unable to obtain information about.

Examination of Contacts.—The total number of swabbings in relation to the series of 60 cases just considered was 336.

An analysis of this figure is appended.

33 were actual cases swabbed during convalescence.

31 were subsequent swabbings in the case of carriers.

272 was the actual number of contacts in relation to the above series of 60 cases.

Percentage of Carriers.—Out of 272 persons swabbed, and who had been more or less in immediate contact with one or other of the 60 cases of the disease, 32 were found to be positive, *i.e.*, 11·7 per cent. Twenty-three or 71·8 per cent. of these carriers were swabbed on more than one occasion. Unfortunately, these carriers were not sent for subsequent swabbing at regular intervals, so that only in a few is there any information regarding the period during which they remained carriers.

In the majority of cases, so far as I can learn, no special treatment, indeed no treatment at all, was directed towards getting rid of the infection.

Analysis of the Figures relating to those swabbed more than once.—Fifteen were swabbed on two occasions only, on the first occasion they were positive, while on the second occasion they were found negative. The average interval between the two swabbings was 31·2 days.

Six were swabbed on three occasions, and were only

10 days after the first. There was one exception, and this person was found to give a positive culture for several weeks. He did not develop the disease. All the carriers were subjected to careful disinfection of the naso-pharynx.

Further Examination for Carriers.—In December, 1915, I was asked to swab 95 persons, who might have been in contact with a case. All were negative.

In January, 1916, I was asked to swab 128 individuals before the new session began. The majority of these were boys who had been on holiday. *Only one was found positive*, and after eight days of special treatment directed to the naso-pharynx, he was found to be negative. One had been declared positive elsewhere a short time before, but was found negative at the second swabbing.

It is interesting to compare these results with those obtained in the case of hospital contacts, and of the civilians respectively.

Out of a series of boys living under the best hygienic conditions, accustomed to spend most of their time in the open air, and after a fairly long holiday, spent mostly at their own homes in various parts of the country, only 2.5 per cent. were found to be carriers.

Out of a similar series of boys still living under excellent hygienic conditions, mostly in the open air, but sleeping in dormitories, 6.4 per cent. were found to be carriers. Some of these boys had been in contact with two severe cases of the disease.

Out of a series of patients, contacts of C.S. fever cases under treatment in hospital wards, the percentage of carriers rises to 12 per cent.

This is much the same figure as that obtained, viz., 11.7 per cent., out of a large series of civilian contacts who were living under bad hygienic conditions for the most part. These figures are instructive, and seem to point to predisposing influence of bad hygienic conditions and overcrowding.

In conclusion, I wish to express my thanks to Captain Rowland, R.A.M.C.(T.), for permission to make use of the clinical notes of the cases that were admitted to the fever hospital under his care.



only one instance was a carrier found among those who were in attendance on the cases at the infection hospital where they were isolated.

BOARDING-SCHOOL CASES.

Two cases occurred, within a few days of each other, among the boys at a certain boarding school in the first week of March, 1915. For the two months preceding these cases there had been an epidemic of sore throats with influenzal symptoms; in many cases accompanied by various types of rash. This epidemic had practically affected everyone in the school. The boys affected showed considerable rise in temperature, which fell rapidly within a few days, and after remaining normal for a day or two rose again, and then gradually subsided. This was accompanied by a relatively slow pulse.

Of the two definite cases of C.S. infection, one was seized with the disease and succumbed within 48 hours. I obtained a pure growth of meningococci from the C.S. fluid, but when I made a post-mortem examination, the lesions were those of acute general septicæmia. There was no purulent exudate over the brain or cord.

The other case was very severe, and I believe that his life was saved largely owing to repeated lumbar puncture, although he was given serum on nearly every occasion. His illness lasted for a month, during which time he had a relapse. He was punctured altogether 13 times, and ultimately recovered without any after-effects, so far as I know.

Character of the Fluid.—In both cases, the C.S. fluid was very turbid. In the case of the second boy, who recovered, the fluid became clear, and with his relapse it again became turbid. From both, pure cultures of typical meningococci were obtained, and these were found to belong to one or other of the strains described by Dr. Arkwright as occurring in the 1915 epidemic. The fluid in both cases was under considerable pressure, and was in large amount, as much as 60 cc. being removed at one time.

Contacts.—Those who were supposed to have been in contact with those two cases were swabbed. They numbered 62, and out of that number four were positive, *i.e.*, 6.4 per cent.

Duration of Infection in the case of Carriers.—All were found negative on the second swabbing, carried out about

during the winter months. Indeed, for some months of winter, no cases at all were admitted to field-ambulances.

A matter which will be referred to more fully later on, may now be touched upon as interesting in connection with the history of trench fever. Lice would appear to play some part in the causation of this illness, for men suffered more from lice in the summer and autumn seasons than during winter. Again, in 1916, the spring saw an increase in the number of trench fever admissions, and very many cases have occurred so far in the summer months.

A peculiar item in the history of trench fever is the fact that no recorded or suggested cases of trench fever have occurred in England during the training of the new troops, although this training occurs, as far as possible, under the same conditions as obtain in France. They have trenches, which were partly filled with water, if Nature had not saved them the trouble, they have the long nightly vigil, and practically the same food. I was associated for a long time with a regiment which was doing duty on the East coast. Here the hardships were many and, accompanied by cold and wet, the strain on the system was very trying. No case of pyrexia approaching the condition found in France ever came under my care. There were many cases of transient pyrexia, but these were not characteristic, and had none of the associated symptoms of trench fever. Again, trench fever occurs in units in France and Belgium, which are not near the line, but are in touch with it in some way, such as the A.S.C., and trains of artillery; whereas, units escape which remain behind, and have no direct connection with the line.

In the earlier Belgian War, a low fever, called Flanders fever, was described, but the accounts are very meagre. This condition may be associated with trench fever.

The incidence of trench fever does not call for very much comment, for very little can be said definitely of it.

(1) *It occurs in men*, but only, perhaps, because women have not been exposed to the conditions which give rise to it.

(2) *Age* plays some part, for soldier adolescents are far more susceptible than the older and more seasoned men. This is not characteristic, for it is true of most fevers of this type.

(3) *Place*.—It would appear to occur in France and Bel-

TRENCH FEVER—MAINLY ITS CLINICAL
MANIFESTATION.

By CAPTAIN J. M. A. COSTELLO, R.A.M.C. (T.F.).

IN 1915, a great many soldiers were sent sick to field-ambulances, with a pyrexia, of varying degree, which, under observation, pursued a very unusual but constant course. At first, these cases were variously diagnosed as influenza, febricula, myalgia; less often, rheumatism, acute and sub-acute, septicæmia, auto-intoxication. In fact, so varying was the diagnosis, that it soon became evident that a new condition, having pyrexia as its peculiar characteristic, had arisen, and colour was lent to this assumption by the difficulty experienced by many clever and painstaking observers in coming to a decision as to the real nature of the condition.

For a long time auto-intoxication, the result of some change in the system from the new conditions of climate, living, and feeding, and the work imposed upon the citizen-soldier when he took on service obligations, in most cases a great change from the normal avocation, held the field as the main cause of the pyrexia. But it could not be the only cause, nor, as became clear afterwards, the main cause; because, in many cases, there was no evidence of auto-intoxication, there was an absence of the symptoms which accompany auto-intoxication, and there was a new set of symptoms, which were foreign to auto-intoxication. These cases were first noticed particularly in men who had been in the trenches for some time, and who had been through hard work, with added trials of mud, rain, cold, and sleeplessness, which are inseparable under certain conditions from hard work in the trenches. Hence, the name "trench fever" was provisionally given to this condition. This name has remained, for want of a better; though now it is well known and established that trench fever may occur in a man who has never been in a trench in his life. This condition persisted all through the spring, summer, and autumn, but there was a decided decrease in the number of cases occurring

headache. Next morning his temperature was 99° , and the pains better. Evening again saw a rise of $99^{\circ} \cdot 5$, increasing at 11 o'clock to 101° , when the pains again became very severe. The temperature then followed a typical course. Similar instances occurred several times while the investigation was going on. This would point to an occurrence of trench fever by infection. Yet from cases in the field-ambulance, an interesting feature in connection with this ætiologically, *close contacts* with the cases *escaped*, except in one instance. The same thing occurs in connection with cases of C.S.M. Some other factors, therefore, must come into play, which have an important bearing in determining the infection. One factor, in my opinion, comes very prominently to the fore as a predisposing cause, viz.:—

(2) *Anxiety, Strain, Overwork or Worry*.—I class all these together, because they form one set of causes. This has been very evident in nearly all my cases. Again, this factor is not confined as a causative agent to trench fever, but is a common feature in most diseases. However, the fact remains, and is clearly evidenced in numerous instances, that mental strain places a man in such a state that he is easily infected by the fever.

(3) *Wet and Cold* are, again, very important predisposing causes, and a history of such conditions has been elicited in many cases. When the trenches were very wet, and the nights were very cold, the men began to arrive in hospital with this curious pyrexia.

(4) *Sleeplessness* was often complained of as the cause of this illness. Men said that after doing sentry duty for several successive nights, they began to feel ill, and reported sick. The temperatures were up to various degrees.

(5) *Lice*.—This is a very important factor, which has given rise to a good deal of controversy. That a lousy condition was a big predisposing factor in the causation of trench fever was strongly held. Acting on this assumption, one investigated very carefully all cases presenting a pyrexia as their main complaint. Here, it may be stated, that positive evidence was found in all cases, even those who were not in the trenches. But then a history of lice was obtained in every case which was admitted to the field ambulance, whether the condition was a sprained ankle, or turned out

gium, but not in England. It has not been established, in my opinion, that it occurred so typically in the Dardanelles, Egypt, or Salonica. This last information I have obtained from a captain of the R.A.M.C. in Salonica, who saw some cases in the earlier days in France. To one of the general hospitals in Marseilles, last March, several cases of pyrexia, with vague pains, were admitted from a hospital ship from the Egyptian theatre of war. These were provisionally diagnosed as relapsing fever, but, with the most careful blood examination, this could not be established, and a diagnosis of influenza was then made. These cases may have been trench fever, for they had the peculiar pyrexial recurrences and the limb pains. If this surmise is correct, of course, one must admit that such cases can, and do, occur in other places.

(4) Spring, summer and autumn are more favourable to its occurrence than winter. Here, again, one has had only two winters, during one of which the condition does not appear to have been recognized at all, leaving only one winter to judge from, and two sets of the rest of the seasons. Certainly, it is well established that very many *more cases occur in the milder seasons*, and that spring and autumn are more favourable to its occurrence.

(5) *More cases occurred in units in the trenches* than in those a little behind the line.

CAUSATION.

(1) *Infection*.—The organism has not been isolated yet. The infectious nature of the condition is shown by the many instances of trench fever, which have occurred amongst those who were in attendance on the cases. The condition, in some cases very typical, in others very suggestive, occurred frequently amongst the orderlies who were nursing the trench fever cases. These instances were very instructive. A sergeant, who was in charge of one of the huts, reported, one morning, that he was not feeling well. His temperature was taken and found to be 102° . He did not complain of any other symptoms just then, except a feeling of fatigue all over. He was put to bed, and his temperature taken in the evening, when the thermometer registered 103° . He now complained of pains in the legs and

headache. Next morning his temperature was 99° , and the pains better. Evening again saw a rise of $99^{\circ}5$, increasing at 11 o'clock to 101° , when the pains again became very severe. The temperature then followed a typical course. Similar instances occurred several times while the investigation was going on. This would point to an occurrence of trench fever by infection. Yet from cases in the field-ambulance, an interesting feature in connection with this ætiologically, *close contacts* with the cases *escaped*, except in one instance. The same thing occurs in connection with cases of C.S.M. Some other factors, therefore, must come into play, which have an important bearing in determining the infection. One factor, in my opinion, comes very prominently to the fore as a predisposing cause, viz. :—

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symptoms without pyrexia, and I had ample opportunity, when regimental medical officer, of seeing cases, which turned out to be trench fever at the beginning. Feeling very hot was one of the main initial complaints.

Pyrexia.—The initial temperature is from 99° to 102° , rising, in the evening, a degree or half a degree. This pyrexia runs a course of from three to seven days, and then drops to normal or below. It remains normal for three to eight days, and a recurrence of the pyrexial period occurs. This, again, is generally followed by a normal period, and succeeded by a third pyrexial state. A fourth attack does occur sometimes. The third attack is not so usual, and the fourth less so. The common drop in the temperature is by lysis, but it may also occur by a crisis. The class "A" which Captain McNee describes as having a temperature of longer duration in the first period followed by only one relapse, was fairly common.

Certainly, when the temperature never rose very high, up to 100° , it would appear that there were more relapses. The relapses in my series of cases generally occurred on the third, fifth, or seventh days after the original pyrexial elevation. In many cases, the relapses were not so severe as at the first attack. An interesting case was noted, in which the elevation of temperature, with accompanying symptoms occurred in the morning, and the drop at night. The pulse does not rise very high; even in cases with a high temperature, the pulse rarely goes above 100. A higher pulse is often recorded when the patient is brought in, but this, apparently, is due to the exertion and excitement consequent on the removal of the case from the trenches to field-ambulance and then on to the Divisional rest station.

(2) *Pains.*—The pains are of two kinds, viz.:—

(a) *In the Head.*—The common characteristic pain is occipital, giving rise to pain down the neck and some stiffness. The pain increases as the evening rise of temperature occurs, and abates as the morning fall is noticed. During the normal period the pain is much easier. Frontal headache is often complained of, and may be very intense. It is possibly of the neuralgic type, the back of the eyeball feeling very painful, but the real frontal pain is also often

to be trench fever, or any of the other ills and ailments which visited the soldiers. Indeed, very few can escape the pest; but all did not contract trench fever. So it does not seem to me that one can definitely lay down that a lousy state is a cause of trench fever. The most that can be said, I think, is that it may go into the scales with all the other factors which lay a man open, by lowering his vital resistance, to infection by one or other of the many conditions, which are always hovering about, lying in wait for a suitable field in which to prosecute their baneful energies.

SYMPTOMS.

The most instructive way of discussing the symptomology of trench fever will be to cite a number of cases, and demonstrate on those which are characteristic and on those which are not. First, the following method has been adopted in investigating all cases of pyrexia admitted. I give it in detail, hoping to show that no item could be missed in coming to a decision or obtaining good data for a discussion. Each man was examined as follows:—

- (a) Duration of illness on admission to hospital.
- (b) Onset.
- (c) Symptoms at onset.
- (d) Present symptoms.
- (e) 1, coryza; 2, sore throat; 3, nausea; 4, vomiting; 5, epistaxis; 6, cough; 7, condition of bowels; 8, pains; 9, whether inoculated; 10, condition of appetite.
- (f) 1, service in army; 2, service abroad; 3, whether in the trenches: (a) how long? (b) when last? 4, nature of duty; 5, lice; 6, when bathed and had clean clothes; 7, recent illnesses; 8, civil occupation.
- (g) Family history.
- (h) Physical signs.

A definite set of symptoms can be deduced from a consideration of the cases, and may be classified, according to their importance, as follows:—

(1) The onset is sudden in most cases, the pyrexia showing itself in the first day. I had no cases in which there were

symptoms, the tenderness is worse when the temperature rises. This tenderness is not accompanied by bogginess, redness, or other signs of inflammation.

(5) Tenderness of the spleen region is occasionally felt, but in none of my cases have I been able to trace enlargement of the spleen. One of my colleagues reported that he could feel the spleen in one or two cases, but I was not satisfied. The area of splenic dulness is increased in a number of cases.

(6) Digestive, respiratory, and cardiac symptoms were absent in all the characteristic cases, as symptoms of the fever. These troubles were present in some cases, but were of previous origin.

(7) Constipation was common.

(8) A dirty tongue and a feeling of weakness, with the usual febrile symptoms were present during these pyrexial recurrences.

(9) Sweating very often occurred at night, but this was due mainly to the drugs used in the treatment.

In two cases profuse sweating occurred, although, at the time, no drugs were being given. These were in cases with a long pyrexial period and very intense pain.

(10) A history of a previous attack, similar in character, was often given, and when the interest of the patient was backed by the possibility of his being a pioneer in a new pyrexial condition, very interesting facts of the previous attack or attacks were obtained.

(11) Sometimes a good deal of weakness is left after a number of attacks, but generally the patient quickly recovers, and is able to resume his duty.

DIFFERENTIAL DIAGNOSIS.

One can arrive at a diagnosis of trench fever better by excluding the conditions which simulate it. Indeed, it is possible only to say a case is trench fever, when one has excluded the other conditions. The following are the main conditions which have to be differentiated:—

(a) *Influenza*.—Here, the absence in trench fever of the great bodily weakness or tiredness with the pains all over, the absence of respiratory trouble which is so common in influenza, the greater regularity of the temperature, the

present. This pain may persist, with more or less severity, during the normal period, but may often pass quite away.

(b) *In the Limbs.*—This symptom is very characteristic, and when present in its commonest manifestation, is pathognomonic. The pain starts in the back of the knee, in the lower popliteal space, and courses round to the front of the knee, where the upper end of the tibia lies. The knee-cap area is not usually painful. Down along the shins to the ankle joint, the pain relentlessly pursues its journey. It is, therefore, very limited in its localization. The character of the pain is deep and intense. Here, again, the shin-pain varies in intensity directly with the rise of temperature. The pain is sometimes very severe indeed at night, almost unbearable. One is reminded of the severe pain in rheumatic fever. All cases are not so severe; indeed, some only present a slight increase of pain at night. It is to be noted that the pain is greater with the higher temperature. This pain lessens as the temperature falls, and in the morning, when the temperature is about 99°, the pain is almost gone, and the patient feels fairly comfortable. Again, during the normal period the pain is entirely absent, and the legs are in a perfectly normal condition.

(3) Occasionally, pain is complained of in the feet, but this is probably due to a referred pain from the shins, and is never very intense. Pain is felt occasionally in the lumbar region; but, again, this would appear to be a result of the symptoms, and not a symptom in itself.

(4) *Tenderness.*—This is a very characteristic symptom too. Unsolicited evidence is often given, and can always be diplomatically obtained, of the tenderness. The patient will tell that he had to remove his puttees to ease his shins. A little questioning will elicit the important fact that the relief thus obtained is quite different from the relief obtained under normal conditions by taking the puttees off. The pressure of the puttees causes distinct pain to the shins. Again, one will be told that the blanket could not be borne on the legs. Movement does not seem to increase the pain when lying down, but does so if the patient walks about, or when one leg is put over the other. The tenderness can always be demonstrated by pressure along the shins. Sometimes the tenderness is very pronounced. Again, as in all these

symptoms, the tenderness is worse when the temperature rises. This tenderness is not accompanied by bogginess, redness, or other signs of inflammation.

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more strikingly sudden onset, and the presence of the relapsing pyrexia, give one good grounds for diagnosis. Again, the marked influence of the salicylates in influenza, in reduction of the temperature and alleviating the pain, and the absence of the decided change in the intensity of the pains at night, still more determine the illness under observation.

(b) *Malarial Group*.—The characteristic stages are absent in trench fever. The influence of quinine is negligible. In many cases, the patient has never been in any foreign country. The pain, also, is very different in character.

The bacteriological examination immediately settles all doubts, however, and makes the diagnosis simple.

(c) *Sub-acute Rheumatic Fever*.—The heavy sweating, with its characteristic smell, the continuance of the fever, without relapses, and the pain in the joints, present a very different picture from that which the trench fever symptoms show. Again, the influence of treatment in rheumatic conditions is important. Single and multiple articular rheumatism are easily distinguished.

(d) *Enteric Group*.—The para-typhoids, A and B, often give a good deal of trouble in diagnosis, since they may present a clinical picture very like trench fever. The initial temperature may be the same, and even the pains in the legs may be present, but the examination of the blood and stools places the condition in its right clinical category. The series of cases mentioned earlier in this article from Marseilles, bear out this similarity. The dicrotic pulse could not be definitely determined.

(e) *Cerebro-spinal Meningitis*.—A low form of cerebro-spinal meningitis is not uncommon, and I would like to point out the following distinctive points:—

Stiffening of the neck and legs is not present in trench fever, and rigidity of the muscles is entirely absent. Vomiting is not common in trench fever. There is complete absence of any sign or symptom of cerebral irritation. Girdle pain, so common in this type of cerebro-spinal meningitis, is not present, a "belly ache" is complained of occasionally, but it is not a girdle pain. Kernig's sign is absent. Again, the discovery of the diplococcus in the spinal fluid and the immediate amelioration of the symptoms in cerebro-spinal meningitis on withdrawal of the spinal fluid will clear away

any lingering mists of doubt. The fever is continuous in cerebro-spinal meningitis. Injection of Flexner's fluid has no effect in reducing the symptoms or improving the condition.

(f) *Relapsing Fever*.—The history of the case is important; the finding of the organisms in the blood will settle the question of diagnosis.

(g) *Acute Periostitis*.—Owing to the intense pain and fever, this condition may come to one's mind. There ought not to be any difficulty in differentiating, however, for the limbs in trench fever do not get inflamed, do not swell, and do not become boggy. The pain is always intense day and night, and the fever keeps high in this condition.

TREATMENT.

The treatment of trench fever is very unsatisfactory, principally because, so far, the chief causative feature is unknown. It may be interesting to give my experience of the different drugs that were tried.

(1) *Sodium Salicylate*, in small doses and big doses, was tried in many cases, but one could not say that much benefit accrued. Certainly, the intense night-pain was absolutely unaffected by even large doses.

(2) *Quinine* had no effect at all on the course of severity of the disease. Intra-muscular injection of quinine bihydrochloride, gr. 3, was used in several cases. Two said they felt much better after the injection, which was given when the pain was bad. One of our own orderlies attributed his recovery to the injection.

(3) *Potassium Iodide* was also tried, but had so little effect that no more need be said of it.

(4) *Arsenic* had no effect.

External applications were used, and wrapping the limbs in cotton wool, from which a little relief was obtained. Purgation and rest in bed, with a milk diet, was routine treatment. Hypodermic injections of morphia were sometimes given, when the pain was very intense.

PATHOLOGY AND BACTERIOLOGY.

Very little has been found out under this heading in the case of trench fever, although exhaustive examinations have been made by Captain McNee, Arnold Renshaw and E. H.

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THE TREATMENT OF SEPTIC GUNSHOT FRACTURES OF THE LONG BONES BY MEANS OF A STEEL EXTENSION APPLIANCE.

By CAPTAIN R. E. HUMPHRY, R.A.M.C. (T.F.).

Second Senior Resident Surgeon, Wharnccliffe War Hospital, Sheffield.

A FEW months ago, an exceptionally severe gunshot wound of the shoulder came under my care at the Wharnccliffe War Hospital, Sheffield. The treatment of this case presented so many difficulties, that it led to my designing the steel extension appliance (*shown in diagram*), which I found to be very efficient. It will, I think, solve the difficulties in the treatment of certain other types of gunshot fracture, which, hitherto, have been specially troublesome to deal with by any of the existing methods, and which invariably end in either a badly crippled limb or amputation.

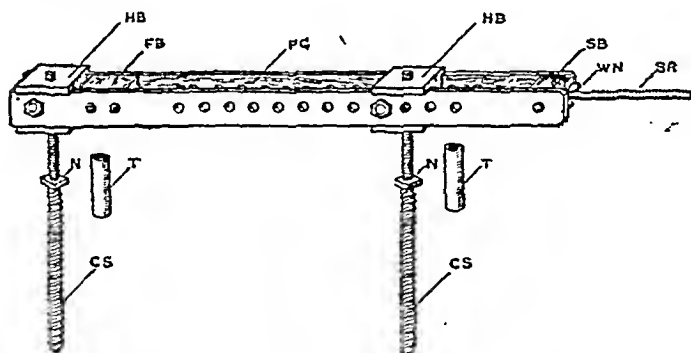


FIG. 1.

Two parallel girders (PG), of light "steel," 12 inches long by $\frac{7}{12}$ inch wide, are blocked $\frac{5}{12}$ inch apart, and securely held by two rivets passing through the fixation-block (FB) near the left-hand extremity. Two 6-inch carpenter's screws (CS), which are $\frac{7}{32}$ nds of an inch thick, are employed. The heads are sawn off, a thread cut on the upper half of the screw, and a small nut run down on this

Brunt, who published the results of their experiments in the *R.A.M.C. Journal* of 1916 (April). They made blood cultures in a variety of ways, neglecting no possibility which might lead to a positive result, but invariably the results were negative. They demonstrated certain morphological changes in the blood, the presence of polychromatophile cells above the normal size, and, in certain cases, the presence of well marked punctate basophilia. The leucocytes were only very slightly relatively increased. Their experiments show that the whole blood is infective, but that the serum is not. The shin-pain, which was so constant in my cases, does not seem to have been so definite in the cases which were the result of inoculation with the infected blood. Blood corpuscles were found to be infective as well, so the presumption that the virus is intra-corpuscular is just. So far, no parasite has been detected.

The infective nature of trench fever is thus well established, by its ready transmission from one person to another, and by the clinical manifestations. In conclusion, one may state that trench fever is established as a definite clinical entity, and that complete recovery is the rule.

I would like to thank Captain Pollard, Captain Sadleir, and Lieut. Lloyd for their assistance during the investigations.

and simplifying the diagram, I have only drawn 12 holes, and put them proportionately further apart than they really are.

The parallel steel girders can easily be sprung apart, in order to insert the small straining block in its position. Two short lengths of ordinary iron, brass covered, curtain rod tubing are used at the time of the operation, in order to get the screws nicely fixed. These tubes (T) are $1\frac{1}{4}$ inches long, and $1/3$ rd inch in diameter. They simply act as sleeves, to drop on the top portions of the two 6-inch carpenter's screws. Each rests below on the nut (N), while the head-block screws down on the top of it and becomes fixed. The head-block now forms a capital handle at end of the screw, by means of which one can control it, and screw it in properly. It is inadvisable to attempt to drive a 6-inch screw into bone with a screw driver, for it would be very apt to slip and injure one's hand, or split the bone. When the two screws have been fixed in the required positions, and at the requisite depth and angle, the head-blocks are again unscrewed, the cuffs of tubing lifted off, and the head-blocks replaced. As one screw will usually be going into the cancellous bone tissue at the extremity of a long bone, and the other into a compact bone tissue of the shaft, it will be necessary for the former to be screwed in to a much greater depth than the latter. This can be compensated for, because the head-blocks can be turned to any height on the upper half of the screw, above the nut (N), and thus the double steel girder can still be fixed parallel to the shaft of the bone to which the extension is going to be applied. In getting it into position it is always necessary to slide the straining-block end in first. By means of this apparatus a powerful extension can be attained, and maintained, and the pull is centred, with rectangular rigidity at both ends.

In Figs. 2 and 3 the second metal splint has no connection with the extension appliance, a short straight piece of wood, or Gooch splinting, being all that is necessary. The whole instrument can be sterilized in the usual way.

The second metal splint is another simple device that I have found useful. The set consists of lengths of thin steel, 1 in. in width, and 11 in., 8 in. and $6\frac{1}{2}$ in. in length; and pieces of still thinner, and quite malleable iron, also 11 in., 8 in., and $6\frac{1}{2}$ in. long, and 1 in. broad. The malleable

to the top of the wood-screw portion.

Two somewhat "H" shaped head-blocks are now filed out of soft iron to run between parallel steel girders, the flanges above and below being made to come flush with the outer surfaces of the girders above and below on either side. (If a number of the appliances are required, the best plan is to mill a bar of mild steel so that its transverse section corresponds with the ends of the head-blocks, longitudinal axes. This rail can now be drilled, and from it a number of head-blocks sawn off. In this way they can be made quickly, and also smaller and lighter, while they are equally strong, and the sliding grooves are mechanically accurate.) These two head-blocks are now drilled vertically through the centre of their transverse axes, but rather to the right of the centre of their longitudinal axes, and these holes are tapped to screw on the upper half of the carpenter's screws. One other hole is now drilled horizontally from side to side of each block, passing through the block to the left of the vertical screw-hole; this is for an iron pin to go through both girders and the head-blocks, and be fixed with a small plain, or winged, nut on the opposite side. The centre of the right side of the right-hand head-block is drilled for about a quarter of an inch, and tapped for a straining-rod (SR) to screw into. SB is a small straining-block, with a hole through its centre, through which the straining-rod passes easily, and against which a winged-nut (WN), when screwed up, effects a direct pull on the sliding head-block, and which is capable of fine adjustment. The straining-rod should be 7 inches long, with a screw-thread cut on its entire length. It is not an essential part of the apparatus, but can be very useful, for, if desired, a turn can be given to the winged nut each day for several days after applying the extension. It can be dispensed with by putting the small bolt either through or in front of, the sliding head-block, and unscrewing it from same. If not used the two head-blocks are interchangeable.

The parallel steel girders have 24 holes drilled through both. The centre-punch starts for these holes should be one-third of an inch apart, which allows for a very small increment of adjustment, because the fixing pin can be inserted either through the head-block or in front of it. In the latter position, it gives an advanced extension about halfway between two holes. For the sake of foreshortening

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FIG. 2.



FIG. 3.

steel is to form a stiff straight, or nearly straight, support in the longitudinal axis of a limb, and is drilled with two holes, placed transversely, half-an-inch apart, at intervals of one inch. With the aid of a hammer and some bifurcated, or tubular, rivets, a splint can be made at the bedside in the space of a few minutes, to suit the individual requirements of the particular case. The transverse soft iron bands are now curved, and simply gripped round a piece of stiffish rubber sheeting, placed round the limb. The advantages are, that no further padding is necessary; there is nothing to soak up discharges and a better, and more mouldable, hold can be effected, without immobilization of adjacent joints; it also means a saving in bandages and wool.

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band, Head of the Civil Engineering Department of the Sheffield University, who has made these splints, and the extension appliances, for me, and who has also helped me in their design.

The case in question was that of a private in the ——— Welsh Regiment, aged 42 years. He was wounded in France by a shrapnel shell on October 7, 1916. When he came under my care a week later, on October 14, he was looking pale and ill, with a temperature varying between 101° at night, and 99° in the morning. There was a very large perforating wound from before back, through the left shoulder. The wound of entrance was situated on the front and outer side of the prominence of the shoulder, it was still

rather larger than a crown piece in size, while protruding from it were the pulped, lacerated, and œdematous muscle fibres of the deltoid, and the whole of the fractured surface of the neck of the humerus. The wound of exit was situated posteriorly to this, below and behind the scapulo-humeral joint, completely obliterating the posterior axillary fold. In size, this wound was quite as large as the palm of one's hand, and it had protruding from it, pulped, lacerated, and swollen muscles like the wound of entrance. Both wounds were copiously discharging a thick, greeny-yellow and slightly offensive,

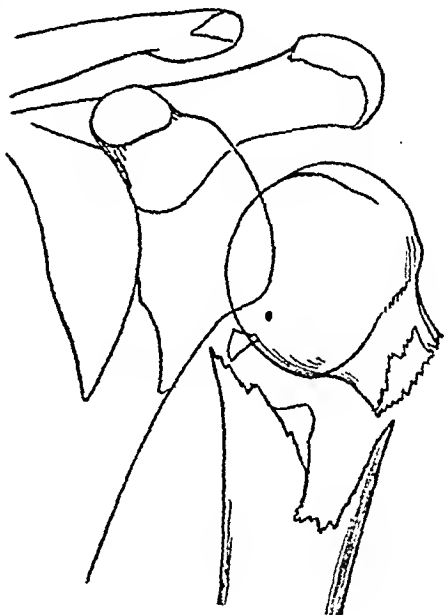


FIG. 4.

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Fig. 4 clearly shows this, together with a considerable tilting up of the upper fragment, from the pull of the scapulo-humeral muscles, which, in this case, were practically unopposed, owing to the laceration and pulping of the deltoid, together with the situation of the skin wound.

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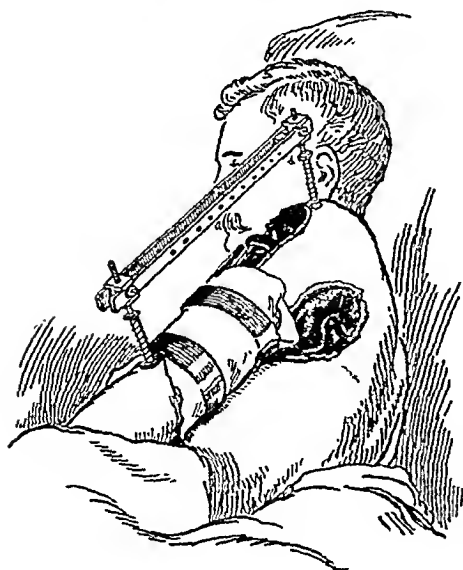


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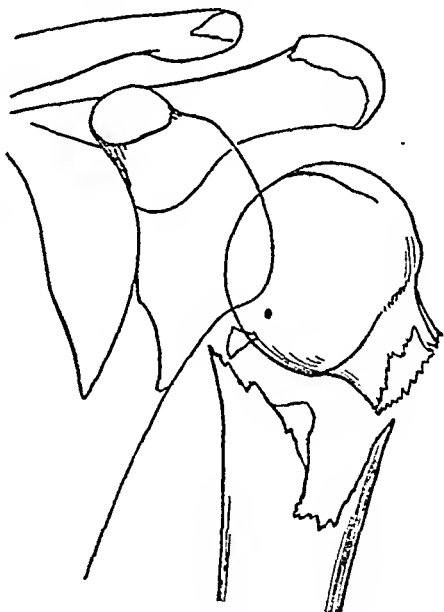


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organisms, the danger of a secondary hæmorrhage from the third part of the axillary artery was ever present. On October 25 the first operation was performed under the ethyl chloride-ether sequence. A half-inch incision was made on the top of the shoulder, just below the tip of the acromion process, and the muscular fibres of the deltoid were separated with a blunt dissector through this button-hole on to the bone. Drill now passed in, and the head of the humerus drilled almost vertically downwards, but with a slight slant also in the forward direction. The upper 6-inch screw was inserted into this hole, and screwed deeply into the cancellous bone of the head of the humerus. A second hole was now drilled into the compact bone of the shaft of the humerus, in the lower one-third, well away from the

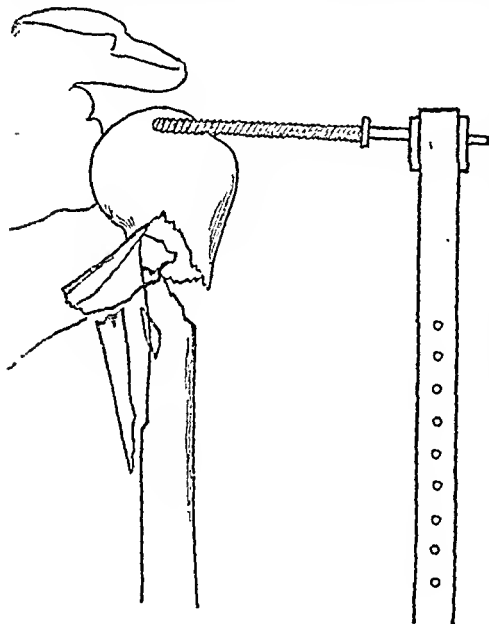


FIG. 5.

wounds, and below the musculo-spiral groove, with its contents. The other 6-inch screw was fixed firmly into this, going well into the medullary canal, but not through the opposite side. Having removed the iron collar, and slid the cross-beams on to the lower head-block, the upper screw and head-block were pulled down through a right-angled arc, thus depressing the head of the humerus, and overcoming the pull of the supraspinatus and infraspinatus muscles. This screw was also carried a little backwards, to rectify the pull for-

wards of the teres minor, and the cross-beams slid into the grooves of this head-block, the pin inserted, and the extension appliance assembled. Considerable manual extension was now applied to the left forearm, and the sliding lower head-block fixed with pin and nut at the furthest extension obtained. Rectangular rigidity now maintained between both screws and connecting beams. Upper and lower fragments felt to be in position. Wounds of both entrance and exit scraped, and good drainage established.

Fig. 5 was taken immediately after the appliance had been fixed, and while the patient was still under the anæsthetic. On the following day the extension was increased one hole. Patient's temperature had, of course, gone up, and had even touched $103^{\circ}4$. Morphine was given hypodermically for the subsequent pain, though this was not excessive.

Fig 6 was taken five days after the extension appliance had been fixed. The rapid falling into position of the comminuted fragments is well demonstrated. A week after the first operation the extension was increased one more hole. The temperature was now coming down steadily and the discharge becoming much thinner. By the fourteenth day, the temperature had come right down, and the evening and the morning temperature were only varying about one degree, between 98° and 99° . The two portrait photographs (Figs. 2 and 3, page 470) were taken at this stage. The position of the two wounds, which precluded the employment of any of the ordinary methods of extension, can be seen, and some idea of their size obtained, though it must be remembered that they were both now much contracted, this being the thirty-fourth day after the infliction of the wound.

The photographs also show the comparatively comfortable position of the arm, that the elbow-joint, wrist-joint, and finger-joints are not interfered with, and that the patient is able to use his hand and the muscles of his forearm, although only a fortnight has elapsed since the appliance was fixed.

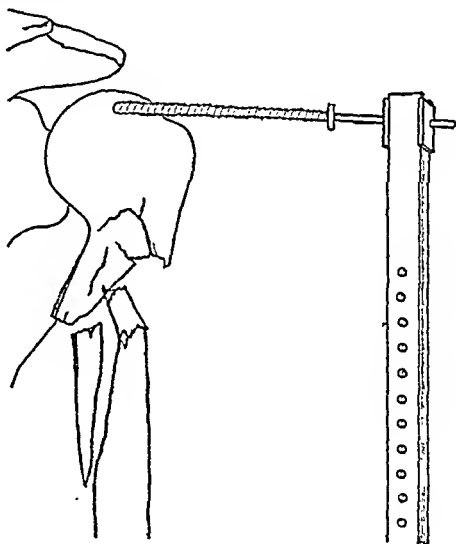


FIG. 6.

Unfortunately, at this juncture the patient developed a broncho-pneumonia, on the opposite side of the chest, but, despite this, by the twenty-first day, practically all discharge had ceased, and both wounds were healing rapidly. The extension appliance was removed (without an anæsthetic and without pain) on November 29—just five weeks from the day it was applied—and the arm fixed to the side with strapping. A fourth skiagram was taken, which showed that the position was still very good, and that abundant callus was being thrown out from all the comminuted fragments. On December 4 a second operation was performed under chloroform. An incision was made from wound of entrance to wound of exit, muscles between the two wounds divided transversely down to the bone, and the whole site laid freely open. Two or three minute sequestra were removed, also a very small foreign body, and one quite small piece of bone that would inevitably have formed a future sequestrum. Wound now sterilized with 5 per cent. carbolic, then alcohol, and,

lastly, treated with bismuth-iodoform-paste. The-scar tissue having been excised, the muscles were rejoined and all closely sutured. Healing by first intention took place, and on January 9 of this year a third, and final, operation was undertaken to relieve the webbing effect between the arm and the trunk, produced by the large suppurating wound of exit, and to free the shoulder joint. The cicatricial webbing was divided transversely to a considerable depth, and forcible passive movements were employed to free the stiffness of the scapulo-humeral joint. The remains of the scar tissue were now excised, and a flap cut from the infra-axillary region, which was turned up and sutured in the axilla posteriorly. This promises to be a success, the callus is ossifying, and the patient and his arm are daily becoming stronger. In a few months, he should have a strong arm, with movement of the shoulder-joint, while the movements of his elbow-joint, wrist-joint, and finger-joints have never been hampered.

From this, and many other cases, I am convinced that extension, both powerful and rigid, is the best form of treatment for all septic gunshot fractures, wherever this is applicable. Suppurative arthritis of the knee, as a result of gunshot injuries, forms another very tiresome class of case. These patients suffer an inordinate amount of pain, run high temperatures, and become very ill. Repeated operations for letting out pus become necessary, the condition goes on and on, when the most one can hope for, ultimately, is a stiff leg, and that, usually, when the patient's general health is gravely impaired. Often life is actually threatened, and it becomes necessary to amputate the limb above the knee, in a very ill man. I mean to employ this steel extension appliance in the next suitable case of this kind, open the knee freely in front, remove the patella and infra-patellar tendon, divide the lateral and crucial ligaments, and, with one screw in the femur and the other in the tibia, to strain the knee-joint open so that pus cannot form under pressure, and the joint can be thoroughly irrigated and treated. I shall hope, by this means, to save the limb, much prolonged suffering, many operations, and a portion of the detriment to the general health.

Fig. 7 shows a jagged, sharp-edged, transverse fracture of the lower end of the femur. This soldier had a perforating wound, laterally, through the lower third of the thigh, caused by a machine-gun bullet. When he came under my charge he was looking very ill, his temperature was running about 103° , the limb was much swollen, exquisitely tender, and

both wounds were oozing thick blood-stained pus. The skiagram was taken without delay, and as this showed so much displacement backwards of the lower fragment, with such a sharp upper edge posteriorly, and as it was now the ninth day after the gunshot wound had been inflicted, I forestalled eventualities by amputating through the lower part of the thigh. At the time of the operation, on examining the site of the fracture, it was certain that I was only just in time to prevent a secondary hæmorrhage from the popliteal artery. The decision to amputate resulted from a previous experience of two other almost identical cases. In both I had to perform emergency operations for secondary hæmorrhage from the main popliteal vessels. In the first one, the bleeding was profuse and arterial, and I tied the femoral artery in Scarpa's triangle. Amputation through the site of the fracture became, however, necessary a few days later, owing to impending gangrene. In the second case, the hæmorrhage was considerable, and chiefly venous. Here the popliteal vein had gone, and there was, in addition, arterial bleeding, I think, from the popliteal artery. In this case, amputation at the time could be the only right procedure.

These three cases illustrate another class of septic gunshot fracture that is almost impossible to deal with by existing methods. I think, in any of these three cases, the steel extension appliance in question could have been used. Further, that had it also been possible to employ it soon enough, the almost inevitable danger of a severe secondary hæmorrhage from the main popliteal vessels would be put out of court, that the limb, and probably the knee-joint, might have been saved.

Where the fracture is merely transverse, or oblique, is situate at the extremity of a long bone, like the femur, and is in the region of cancellous bone tissue, even though the wound may be very *septic*, and there be present considerable displacement, there is another way of dealing with the difficult situation. It is undesirable to attempt to wire, screw, pin, or plate such a septic fracture, apart from its not being an easy procedure. If the fracture is not comminuted,

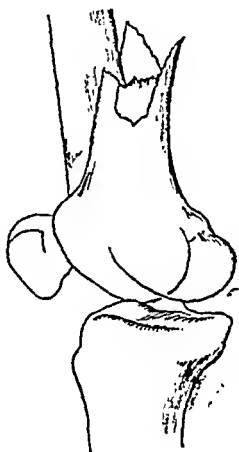


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ACIDOSIS, WITH SPECIAL REFERENCE TO CHILDREN.*

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University Tutor in Clinical Medicine, Royal Infirmary, Edinburgh.

DURING the last two years, our medical thoughts have been directed in a large measure by the various aspects of the present colossal war, as represented by injury and disease. I propose, therefore, to divert thoughts back to a subject which has no direct relationship to the war, and intend to speak about the subject of acidosis, more particularly in relation to disease in children. In our daily work, we are often faced by obscure problems when dealing with acute disease in childhood, and I think some at least of these conditions are made clearer to the clinician, when he bears in mind the possibility of an acidosis being present, if not as a causative agent, certainly as a secondary phenomenon.

DEFINITION.

The term acidosis is commonly applied, clinically, to denote a disturbance of metabolism in which certain abnormal organic acids are formed in the body, circulate in the blood, and appear in the urine. It may be a lactic acid acidosis, but the term is usually employed when we wish to designate an acidosis due to the presence of acetone bodies in the urine. These bodies are β -oxybutyric acid, acetoacetic acid, and acetone.

It has been pointed out by Bainbridge that this term, "acidosis," should clearly be distinguished from the phrase, "acid intoxication," which, he says, should be limited to conditions in which, in addition to acidosis, toxic symptoms referable to the presence of these organic acids make their appearance. It is doubtful if this term "acid intoxication" should ever be employed, because it tends to give one the impression that an acid reaction of the blood develops, but

* An address delivered to the Southampton Medical Society.

or if the comminution is only negligible, I have employed "steel dogs" (an adaptation of the heavier iron variety used by some carpenters for pulling pieces of wood together, and holding them). I made one in very thin sheet steel, similar to the sheet steel used for making Gillette razor blades and pen nibs. From this, Mr. Husband cut a die, and now he is able to press them out for me in any desired length and width. I have utilized them in four or five cases of excision of the knee-joint to pull the cut surfaces of the tibia and femur together, and to fix them in position. I have found that they drive well, with a little care, and that they hold very firmly, also, having got the limb into the exact position required, the opposing surfaces of bone can be immediately and rigidly fixed, and even pulled more firmly together, maintaining the position to a fiftieth of an inch. The sizes I have found most convenient are $1\frac{1}{2}$ -in. by $5/12$ -in., 1-in. by $5/12$ -in., and 1-in. by $7/12$ -in.

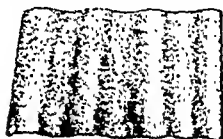


FIG. 8.



FIG. 9.

The steel dogs are fashioned similar to the corrugated iron used for the roofs of out-houses, etc. See Figs. 8 and 9.

The corrugations are parallel to each other on either side of the middle line, but the two corrugations immediately adjacent to the middle line, diverge from one another. The side where the corrugations converge is to remain blunt. The opposite side where the corrugations diverge is sharpened to a knife-edge. This is the side which is driven edgewise into the bones to be approximated and joined, the central wide corrugation being placed exactly over, and transverse to, the line of union. They can be driven in till just out of sight. If dealing with a septic fracture, the whole field of operation must be freely exposed by a liberal incision, thoroughly scraped and cleaned, all damaged and pulped tissue excised, and the whole scoured with 5 per cent. carbolic, then spirit, and then every possible recess mopped dry, and scrutinizingly treated with bismuth-iodoform-paste, according to Rutherford Morrison's technique.

If this is done, I think the steel dogs can be used with impunity in a wound that was very septic at the beginning of the operation, an extra amount of the bismuth-iodoform-paste being smeared over their buried edges. Most probably they will not become septic, but if the worst comes to the worst, and they do get infected, the fine cut fissures they make will not do much harm, and it may still be possible to allow them to remain until they have fulfilled their functions, and then expose the site and pull them out.

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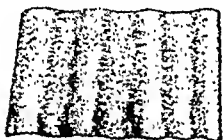


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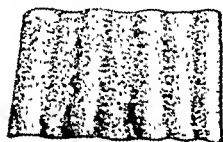


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acetic acid by manufacturing large quantities of ammonia in the process of proteid metabolism. When a state of acidosis is present, the ammonia is prevented from following its normal stages to urea by uniting with the abnormal acids. This being so, we are prepared to find, in a case of acidosis, an increase in the excretion of ammonia-nitrogen at the expense of the output of urea-nitrogen. The total excretion of ammonia-nitrogen can easily be estimated by the formalin method, and a daily estimation of this may be helpful in noting an increase in a suspicious case, always, however, keeping in mind the question of diet in making such calculations. This defensive process against the abnormal acids draws, too, on the fixed bases of the tissues, *e.g.*, calcium, sodium, potassium, and magnesium, and it has been suggested that the symptoms of so-called acid "intoxication" may be due to lack of sufficient bases in the tissues to enable them to function normally.

TESTS FOR ACETONE BODIES.

Preliminary Precautions.

1. Aceto-acetic acid is a very unstable compound, and after being voided rapidly decomposes into acetone.
2. It is known that the quantity of aceto-acetic acid passed in fresh urine of patients suffering from acidosis is very largely in excess of the acetone passed.
3. Fresh pathological urine containing acetone always has aceto-acetic acid present.
4. If the urine has to be kept, a few drops of toluol may be added.

TEST FOR ACETO-ACETIC ACID.

The well-known and simple ferric chloride test is still commonly used. On the addition of a few drops of a solution of ferric chloride to urine, a precipitate of ferric phosphate forms. If aceto-acetic acid be present, a Bordeaux-red colour will develop, and is seen more clearly when the ferric phosphate is filtered off and a few more drops of the iron solution are added. This colour disappears on heating. There are certain fallacies, *viz.* :—

- (1) The urine of patients taking salicylates, antipyrin, salol, etc., gives the same red reaction, which,

it has been shown by Poulton and others that the blood of people suffering from diabetic coma is not acid in the true sense of the word. Poulton has shown that the blood after mild exercise, is more acid than in extreme diabetic coma, and says that "in cases of acetonuria, we must get rid entirely of the conception of acid intoxication as playing any part in the phenomena observed, since it simply does not exist in these conditions."

MECHANISM OF PRODUCTION.

Let me next remind you of the present view as to the production of these abnormal acids.

Many years ago, the view was held that they were derived from the carbohydrates—their presence in cases of diabetes mellitus doubtless giving rise to this conception. At present, we believe they owe their origin to an abnormal fat metabolism. The normal metabolism of fat in the body produces carbon dioxide and water with the evolution of heat. Normally, a small quantity of acetone is excreted in the urine, but too small an amount to be detected by the ordinary clinical tests. It has been proved abundantly that by withholding, or decidedly diminishing, the intake of carbohydrates, the acetone bodies increase in the urine. In the absence of carbohydrate metabolism in the body, fat metabolism is interfered with, and these abnormal acids form by a slower breaking down of the fat. From this it would appear that the process of oxidation of fat and that of carbohydrate are linked together very intimately. This has aptly been epitomized by Rosenfeld, who says "the fats are consumed in the fire of the carbohydrates." It has been shown that quite a small quantity of carbohydrate need be ingested to allow of normal fat metabolism. The process by which these acids induce their poisonous effects is at present undecided, because the introduction of large quantities of these acids into the body will not produce toxic symptoms, and many people may suffer from a mild acidosis for months, but yet develop no toxic symptoms.

In normal metabolism, nitrogen is got rid of chiefly (95 per cent.) as urea—only a small quantity passing off as ammonia-nitrogen. We know the body can develop considerable quantities of antidote to β -oxybutyric and aceto-

acetic acid by manufacturing large quantities of ammonia in the process of proteid metabolism. When a state of acidosis is present, the ammonia is prevented from following its normal stages to urea by uniting with the abnormal acids. This being so, we are prepared to find, in a case of acidosis, an increase in the excretion of ammonia-nitrogen at the expense of the output of urea-nitrogen. The total excretion of ammonia-nitrogen can easily be estimated by the formalin method, and a daily estimation of this may be helpful in noting an increase in a suspicious case, always, however, keeping in mind the question of diet in making such calculations. This defensive process against the abnormal acids draws, too, on the fixed bases of the tissues, *e.g.*, calcium, sodium, potassium, and magnesium, and it has been suggested that the symptoms of so-called acid "intoxication" may be due to lack of sufficient bases in the tissues to enable them to function normally.

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- (1) The urine of patients taking salicylates, antipyrin, salol, etc., gives the same red reaction, which,

however, does not disappear on heating.

- (2) It is to be noted that if a large quantity of aceto-acetic acid be present, the colour will only lessen on heating.

TESTS FOR ACETONE AND ACETO-ACETIC ACID.

Rothera's test was at first believed to show only acetone. It is now known to demonstrate the presence of both abnormal acids.

It is carried out as follows: To 10 cc. of urine in a test-tube an excess of ammonium sulphate crystals is added to saturate the urine completely. To this are added a few drops of a freshly prepared solution of nitro-prusside followed by 2 or 3 cc. of concentrated ammonia. The contents of the test-tube are mixed thoroughly, and allowed to stand for 30 minutes. If the test be positive, a characteristic permanganate-like colour develops above the layer of undissolved crystals.

It is an extremely delicate test, and does away with the necessity of performing two tests.

CONDITIONS IN WHICH ACIDOSIS MAY BE PRESENT.

The presence of acetone bodies in the urines of diabetic patients has long been recognized. It has been proved, too, that they occur in a great variety of clinical conditions in which sugar is not present in the urine, such as—

1. Starvation.
2. Change of diet and surroundings.
3. Gastro-intestinal disturbances.
4. Acute septic conditions.
5. Febrile states.
6. Cachexia.
7. Constipation.
8. Rectal feeding.
9. Delayed anæsthetic poisoning.
10. Toxæmia of pregnancy.
11. Tetanus.
12. Phosphorus poisoning.

Acidosis does not always occur in these conditions,

but it may be present, depending on the severity of the case.

In the above list of pathological states, the patient is either suffering from starvation or an increased metabolism *plus* relative starvation. One can easily recall clinical pictures of acute illness sufficiently vague to cause doubt as to what is the correct diagnosis, and this occurs more often in children, in whom we are dealing with developing structures liable to disturbances of their unstable equilibrium.

It is generally realized that mild cases of acidosis in children are fairly common, and may be passed unrecognized, because they quickly clear up under the usual purge and alkaline tonic treatment. We do, however, meet cases in children, which develop very grave symptoms, and although we all, doubtless, test the urine in such cases for aceto-acetic acid, it seems that if this simple test were more frequently used in general practice in dealing with slighter cases showing gastro-intestinal disturbance, we might have a definite warning as to possible later developments, and a clear guide as to treatment which would ward off the onset of urgent symptoms.

One has been told, in discussing this matter on a previous occasion, that the presence of acidosis in children has been much over-rated, and is only a secondary phenomenon. This, however, appears to be no argument against trying to detect its presence as early as possible.

CLINICAL FEATURES IN CHILDREN.

These vary enormously. Let me briefly outline several acute cases which came under my own observation.

CASE 1.—A girl, aged $3\frac{1}{2}$ years, had suffered from digestive disturbances for over a year. Her tongue was constantly furred, breath frequently heavy, and she had a definite tendency to constipation. Her mother—a very nervous woman—dosed the child freely with calomel and "Gregory," without producing any good effects. Her carbohydrate diet was restricted, and the eating of sweets was discouraged. When I was called to see her, she was seriously ill. Her temperature was 102° , she had a foul breath, was drowsy, and had a general toxic appearance with a quick pulse.

Her mother told me that for several days she was listless, had stopped playing with her toys, vomited two or three times, and was constipated. She would take no food. Physical examination revealed nothing abnormal in chest, abdomen, throat, or skin. A

however, does not disappear on heating.

- (2) It is to be noted that if a large quantity of aceto-acetic acid be present, the colour will only lessen on heating.

TESTS FOR ACETONE AND ACETO-ACETIC ACID.

Rothera's test was at first believed to show only acetone. It is now known to demonstrate the presence of both abnormal acids.

It is carried out as follows: To 10 cc. of urine in a test-tube an excess of ammonium sulphate crystals is added to saturate the urine completely. To this are added a few drops of a freshly prepared solution of nitro-prusside followed by 2 or 3 cc. of concentrated ammonia. The contents of the test-tube are mixed thoroughly, and allowed to stand for 30 minutes. If the test be positive, a characteristic permanganate-like colour develops above the layer of undissolved crystals.

It is an extremely delicate test, and does away with the necessity of performing two tests.

CONDITIONS IN WHICH ACIDOSIS MAY BE PRESENT.

The presence of acetone bodies in the urines of diabetic patients has long been recognized. It has been proved, too, that they occur in a great variety of clinical conditions in which sugar is not present in the urine, such as—

1. Starvation.
2. Change of diet and surroundings.
3. Gastro-intestinal disturbances.
4. Acute septic conditions.
5. Febrile states.
6. Cachexia.
7. Constipation.
8. Rectal feeding.
9. Delayed anæsthetic poisoning.
10. Toxæmia of pregnancy.
11. Tetanus.
12. Phosphorus poisoning.

Acidosis does not always occur in these conditions,

when the nitrogen intake is low the ammonia co-efficient may have no significance whatever.

There is only one other type of acidosis which I shall touch upon, and it is associated with the present state of Europe. At a meeting of the Royal Society of Medicine, Major Dennis Embleton first drew attention to the presence of a very decided acidosis in the urine of many cases suffering from tetanus. He has shown that it develops about 24 hours after symptoms of the disease commences. This may be due partly to the starvation and partly to the excessive tissue metabolism which takes place in this terrible disease. From the clinical point of view, it supplies an excellent indication for an adjunct to the recognized serum treatment of the disease.

TREATMENT.

When aceto-acetic acid is detected in the urine, two obvious indications for treatment arise, viz. :—

1. To stop the formation of the abnormal acids.
2. To neutralize the acids already present.

In children, the condition may be met with in connection with some trivial illness, or it may be present with very urgent symptoms.

In an ordinary so-called bilious attack, treatment is simple. A saline purge, or vegetable laxative, and an enema are given. An ordinary soap and water enema followed by a saline "wash out" is, perhaps, the best method of relieving the large intestine. This is followed by a simple alkaline mixture and dextrose added to the diet, which may require to be albumen water or whey for 24 to 36 hours. Later, oatmeal gruel is very useful.

In severe cases such as cyclic vomiting, in which there is very intractable vomiting, more drastic methods may be employed. As the child is unable to retain any food, nothing can be administered by the mouth. The lower bowel must be unloaded, and a glucose solution of 5 per cent. to 10 per cent. slowly introduced by means of a long tube. Sod. bicarb. may be dissolved in this. Warm water well sweetened, with sod. bicarb. added in 10 grain doses, is given by the mouth. If

hospital. This abnormal acid persisted for three or four days. He examined cases of all kinds, both medical and surgical, and came to the conclusion that the phenomena was due to the change of diet and surroundings. The hospital diet was rich in carbohydrate, but he found by adding a little dextrose to the diet of those patients giving a positive reaction, the condition very rapidly cleared up.

From these observations, it appears rational to give sugar and alkalis to children shortly before operative interference, and not starve them in preparing them for the surgeon.

Rectal feeding is a common type of treatment in cases of gastric ulcer, but it is known to be a definite form of starvation. Experiments in Edinburgh, ten to twelve years ago, showed that the caloric value of various types of so-called nutrient enemata were much less than the minimum requirements of the body. Boyd showed that the best caloric value was obtained from a glucose enema, and even that was pronounced starvation. It has been frequently proved that, during a course of rectal feeding, the excretion of acetone bodies gradually increases.

Another type of acidosis, which may occur in children, is occasioned by phosphorus poisoning. The presence of aceto-acetic acid has been noted in the stage of acute secondary symptoms, when the patient has apparently recovered from the primary acute attack. It would, therefore, appear rational to treat all cases of phosphorus poisoning on the assumption that acidosis would develop.

There is another condition, intimately connected with children, in which acidosis may develop. I refer to the toxic vomiting of pregnancy. In cases of hyperemesis gravidarum, aceto-acetic acid has been noted in the urine associated with an increased ammonia-nitrogen output. In such cases, urgent symptoms may develop, which are not due to reflex causes. In these cases, Whitridge Williams has urged the importance of investigating the ammonia-nitrogen output as an indication to guide one in forming an opinion as to the advisability of inducing abortion, but others believe that this is again simply a question of starvation in which the abnormal acid appears. The practical point appears to be that early cases of vomiting of pregnancy should be treated on the anti-acidosis principle. It should further be remembered that

when the nitrogen intake is low the ammonia co-efficient may have no significance whatever.

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this is vomited, repeat it frequently and apply hot fomentation to the abdomen. As soon as the vomiting abates, give albumen water with dextrose in it.

In the diet of infants, Nestlé's, milk is often used, and has been found successful when all others have failed. In many such cases, the reason for the success is due to the fact that the child is suffering from a difficulty of fat digestion, and Nestlé's milk, when well diluted—as it must always be—gives us a milk rich in carbohydrates and weak in fat. It must, however, be remembered that such milk is deficient in antiscorbutic properties, and cannot, therefore, be continued too long.

Finally, let me summarize what has been said, by reminding you that there is at present a view, amongst some authorities, that too much has been made of this acidosis question. On the other hand, it seems to supply a very definite explanation for many obscure phenomena, more particularly in treating children. We realize full well that we are only on the fringe of this question, but the subject appears to be one of much practical importance, and by testing the urine early and often for aceto-acetic acid in obscure and trivial, yet puzzling, cases of disease in children, one may obtain a clear guide to further treatment and so ward off severe symptoms.



PROSTATIC ENLARGEMENT AND ITS TREATMENT.

By JAMES H. NICOLL, M.B.

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Glasgow, etc.*

[With Plates I.—II.]

SENILE hypertrophy of the prostate once established is progressive. While superadded attacks of congestion of the prostatic circulation, due to various causes, may from time to time cause increase in the bulk of the organ, with corresponding exacerbation of the symptoms (even to the extent of complete retention of urine) and subsequent improvement as the congestion subsides, the adeno-myomatous hypertrophy is not affected. In the great majority of cases, it remains progressive. The enlarged and obstructing prostate, like the established or "chronic" cardiac valvular lesion, is a permanent condition, and, up to a point, the aging urinary bladder tussling with prostatic obstruction resembles the heart struggling to establish "compensation" in face of a valvular difficulty. Under the strain the musculature of both organs undergoes hypertrophy. Much may be done to help the muscle fibres by measures directed to the improvement of the general health, and by the administration of strychnine, pituitrin, digitalin, and their fellows. In both cases, all troublesome symptoms may disappear under such treatment, and the "cure" may be maintained for the period of life.

When, however, the obstructive lesion proves too much for the power of the musculature, the two cases differ, inasmuch as the prostatic patient has still before him the prospect of relief by mechanical means. Such treatment may take the form of catheterization or of prostatectomy. While in certain cases unsuitable for operation

"catheter life," with all its risks, may have to be resorted to, general opinion now tends towards prostatectomy as the routine treatment. The evolution of prostatectomy began well over thirty years ago, but was seriously interrupted by the introduction for a time of castration as an alternative. During that period of interruption, much of the earlier work of MacGill, of Leeds, was lost sight of. Yet to MacGill we owe the practical inception of the modern operation, and to his methods and teaching many surgeons are returning.

Prostatectomy may be carried out by either the suprapubic or the perineal route, or by a combination of them. Its aim is the enucleation of the prostate from its capsule, and, while this is not infrequently effected by the use of instruments, the majority of surgeons use the finger as MacGill advocated. The whole of the adeno-myomatous tissue must be removed, whether *en masse* or piecemeal. The cavity left after enucleation is lined by the pseudo-capsule, consisting of compressed layers of fibro-myomatous tissue containing islets of adenomatous tissue. An experience of prostatectomy extending over some 23 years (*vide Lancet*, April 14, 1894), and giving somewhat ample means of testing various methods, has had the result in my practice that I now rarely perform any other operation than piecemeal prostatectomy by the supra-pubic route, much on the lines practised by Mayo Robson and Fuller, following MacGill. By that method the whole prostate, with the exception of the pseudo-capsule, is easily and speedily removed. Further, the damage to the urethra, sphincter, and vesical floor is reduced to a degree not, I believe, attainable by any other method.

In the operation, the two lateral lobes are removed *separately*. Every hypertrophied prostate consists, like the normal organ, of two lobes. The hypertrophied prostate, however, has often in addition asymmetrical outgrowths, one of the most common of which is the so-called middle lobe. It thus happens that the result of a piecemeal prostatectomy may be the removal of two (lateral) lobes (Fig. 3), of these and a middle lobe (Fig. 4), or, in addition, of several further adenomatous outgrowths found attached to the interior of the pseudo-capsule after removal of the lateral

PLATE I.

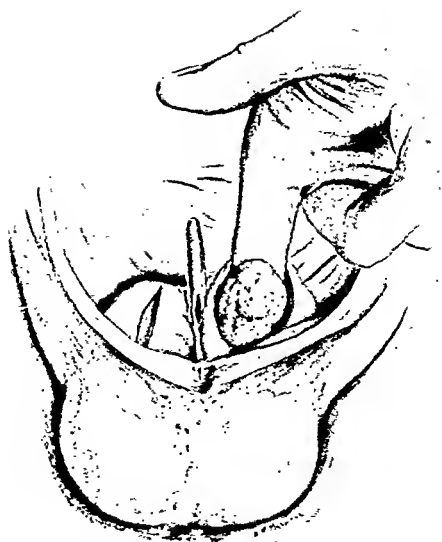


FIG. 1.—*Piecemeal prostatectomy. Digital enucleation of lateral lobes. The incisions penetrate the vesical mucous membrane, and the capsule and pseudo-capsule of the prostate.*



FIG. 2.—*Piecemeal prostatectomy. Empty capsule and pseudo-capsule after enucleation of the prostatic tissue.*

PLATE II.

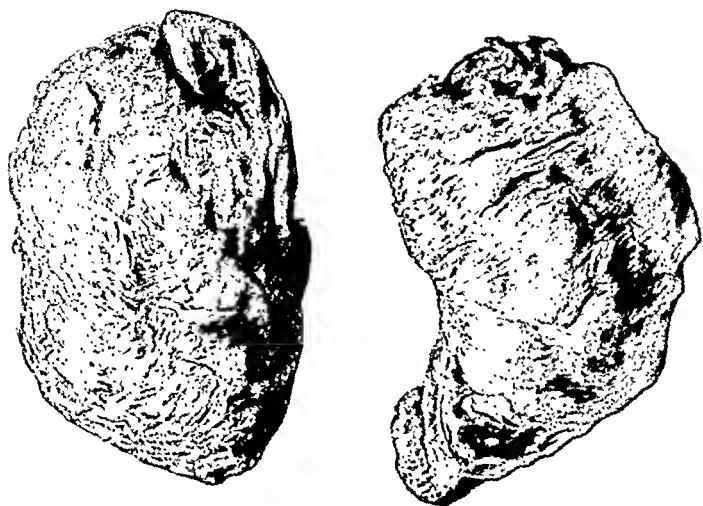


FIG. 3.—*Piecemeal prostatectomy. Entire prostate consisting of the two lateral lobes.*

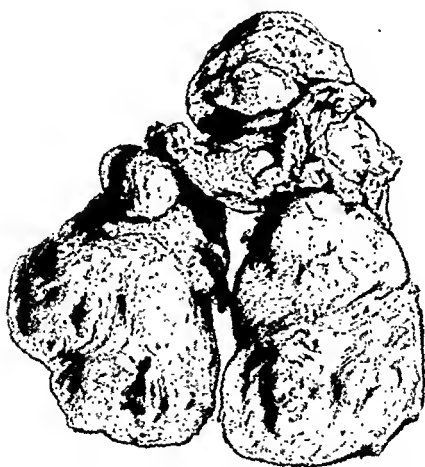


FIG. 4.—*Piecemeal prostatectomy. Entire prostate consisting of the two lateral lobes and a "middle lobe." The three masses were removed separately.*

lobes. It matters little how many portions there are, so long as all the prostatic tissue is removed. In the great majority of cases, however, the organ is removed in two lobes, to one of which a "middle lobe" is often attached.

OPERATION.

(The accompanying illustrations make the steps of the operation clear. Figs. 1 and 2 are, of course, semi-diagrammatic. Figs. 3 and 4 are sketches made for me by Mr. Maxwell, of specimens as they existed after removal.)

After cleansing the operation-field, a double-way metal catheter is introduced, through which the bladder is washed out and distended, the catheter being left *in situ* (Fig. 1). The bladder having been opened over the pubes, the surgeon introduces the fore and middle fingers of the ungloved right hand and examines the prostate. He may find distinct and separate lateral lobes, or these may be fused in a collar surrounding the urethra. With stout scissors or a short-bladed knife, the incisions indicated are made (Fig. 1). The catheter is the guide to the placing of the incisions, which cannot, of course, be seen. They must be of some little depth, penetrating not only the mucous membrane, but the thickness of the pseudo-capsule as well, if the vesical floor, urethra, and sphincter are to escape with the minimum of damage. With the fingers the prostatic lobes are enucleated, while the prostate is pushed up and steadied by the forefinger of the gloved left hand in the rectum. Between the fingers of the two hands so placed, the interior of the emptied capsule, lined by the pseudo-capsule (Fig. 2), is finally subjected to careful bimanual exploration. The surgeon's left hand having been freed of its glove by a nurse, a large drainage tube is fixed by suture in the vesical wound, which is then completely sutured round the tube. Iodoform gauze packing is placed in the suprapubic parietal wound surrounding the tube, and the skin incision is partially closed by suture. Very rarely does hæmorrhage give any trouble.

AFTER-TREATMENT.

At the end of three or four days the packing is removed, and the tube at the end of 10 days. Bladder lavage is rarely employed, never in cases in which at the operation

the ureters were found dilated. In these cases, lavage is apt to wash *débris* up the ureters and cause pyelitis. After removal of the tube, one of the various suprapubic urine collectors may be applied. Should the patient find this irksome, its place may be taken by sterile wool pads frequently changed by the nurse with antiseptic precautions.

Two warnings are given the patient, namely, that he may have rigors after normal micturition is established, and that later he may pass small portions of phosphatic *débris* with accompanying pain and slight hæmaturia. The period of first micturition varies very widely. It may occur within a few hours of operation or not until weeks have passed. Passage of anything like hard phosphatic grit may never occur, and in any case its occurrence is rare in the earlier weeks. The patient is instructed during the first few weeks after healing of the wound to avoid allowing the bladder to become distended, and thereafter only gradually to extend the period of retention to a normal three or four hours.

Prostatectomy, by one method or other, constitutes a radical cure for prostatic obstruction in the large majority of cases in which it is performed. There are, however, two occasional ill results, though with increasing practice they have become less common. One is stricture of the vesical neck or prostatic urethra. The other, more common, is urinary incontinence. Stricture is amenable to treatment (by dilatation); incontinence, unfortunately, is not so. During recent years, in dealing with a large number of cases, I have not met with an instance of either in my own practice, and their absence, I believe, is attributable to the adoption of the "piecemeal" method of removal to the exclusion of all others. By that method the minimum amount of damage is done to urethra, sphincter, and vesical floor.

CONTINUOUS COUNTER-IRRITATION AS A THERAPEUTIC MEASURE IN RHEUMATOID ARTHRITIS, ETC.: DETAILS OF TECHNIQUE.

By W. J. MIDELTON, M.R.C.S., L.R.C.P.

Bournemouth.

IN the October, 1916, number of *THE PRACTITIONER* I gave an account of my experiences with various forms of counter-irritation, but did not include any details about technique. As my article has attracted a good deal of attention, I have thought it well to do this. I hold very strongly that no medical man should adopt a therapeutic measure with which he is unacquainted without taking pains to learn the practical details, no matter how simple they may appear, and it is always wise to begin with easy cases, since, although the device may seem very straightforward, the vagaries of patients are endless. No two are alike, either as regards their diseases or their dispositions. Not only are patients suffering from chronic diseases physically ill, but they are mentally sick as well.

In rheumatoid cases, despondency, unreasoning fear, and self-pity are outstanding characteristics, and are important matters as regards success or failure. Cowardice too has to be reckoned with. The weak-willed sufferer appeals for sympathy, and injudicious relatives and friends cry out against the reactions produced by vaccines, etc., or the discomforts of counter-irritation. There is a tendency toward disappointment, if immediate results are not noticed; or, if prompt improvement occurs and, later on, a recurrence of symptoms sets in, the treatment is apt to be regarded as a failure. Another very real difficulty is the tendency of medical men and laymen to look on arthritis far too much from the point of view of the joints, muscles and nerves, and not enough from that of the brain, spinal cord, digestive apparatus, and the glands of internal secretion. Often considerably before any improvement in the joints, etc., is admitted, there is great betterment as regards pain, sleep,

appetite, digestion, etc. Patients fail to realize that this is effected by removing the cause rather than by means of sedatives, tonics, purgatives, etc. I will now give details of technique.

THE BLISTER FOLLOWED BY SAVIN OINTMENT.

The usual blister is 4 in. by 3 in., and is applied as nearly as possible in the region of the cervical and lumbar enlargements of the spinal cord. In a thin patient, it may be divided into two parts, one being placed on each side of the vertebral spines. I find canthos blister plaster much more suitable in every way than emp. lyttæ. A large pad of cotton wool is placed over the blister when on, measuring, say, 10 in. by 10 in., and on this a piece of guttapercha tissue or other waterproof material, the whole being kept in place by means of a broad bandage or other device. I use a square piece of lint or flannelette, with braces attached to the upper border and bands to the lowest part of the sides. This saves time, and is more comfortable than a bandage. I apply the blister late at night, and remove it next morning. A little chloroform or C.E. should be given beforehand, and a dose or two of tinct. opii, about ℥xx, once or twice daily for the first few days, particularly at night. Any loose skin on the raw surfaces should be removed. A piece of lint large enough to extend an inch or more beyond the raw surfaces is then spread *thickly* with savin ointment (the best savin ointment obtainable is made by Messrs. Wright, Layman and Umney), and applied to the raw place. Small strips of lint attached to the upper border and secured in front of the neck, help to prevent the lint slipping down. This is important, since, if the border of bare lint slips on to the raw surface, it is difficult to remove and causes bleeding. Each dressing is left on, approximately, 12 hours. When changing it, no attempt should be made to clean up the raw surfaces, but the skin around should be carefully cleansed with moist cotton-wool. It should carefully be borne in mind that one is not dealing with a surface one desires to heal, and, that the surfaces are exquisitely sensitive, even a light touch on them being acutely painful. Therefore, the dressing must be lifted off gently and quickly, and another applied, after cleansing the skin. The applica-

tion of the new dressing during the first day or two causes a good deal of smarting, and a little chloroform should be given each time. One should aim at producing a thick, creamy discharge, and the amount covering the raw surfaces should be left there; no harm results, it being sterile—on the contrary, in my opinion, it promotes further discharge. I smear the skin around the raw surfaces with zinc ointment, before applying a new dressing of savin.

In some patients, the raw surface has a tendency to inflame. This should be watched for, and if it occur, resin or zinc should be applied instead of savin for a day or two; after that, it may be necessary to apply a mixed ointment of equal parts of zinc and savin. Generally speaking, however, the raw surfaces will bear the savin dressings very well for at least 12 days, and there is no smarting on changing them after the first day or two.

At the end of 12 days, as a rule, savin is stopped, and dressings of zinc ointment are applied with a view to healing. Sometimes when the discharge is very free, I prolong the savin dressings to 14 or 15 days. This is a matter of judgement. The size of the blister is arbitrary, and, in a small, thin, feeble patient, it is well to use a small blister, at any rate, at first. Sometimes, too, the patient cannot stand more than seven or eight days of savin. Occasionally there is some faintness, but this should occasion no alarm, and is best met by sedatives, especially some form of opium. I have never yet had any reason to regret giving opium to my patients.

I always apply the upper blister, *i.e.*, in the region of the cervical enlargement, first. When the raw surface is healed, I wait six or seven days and then apply one, either whole or divided, in the region of the lumbar enlargement, and proceed precisely as in the case of the upper. When this process is at an end, I usually wait three or four months, and merely treat symptoms in the interval. Then I begin again, and do just as before. A third course may be gone through at the end of a further six months. The patient is usually kept in bed during the treatment. Sometimes, very little benefit is noticed after the first course; in fact, all the symptoms may be exaggerated, and the patient may become very cantankerous and hard to manage. Generally

speaking, however, I can induce my patients to persevere, and as the results are so eminently gratifying, I have no hesitation in bringing out my powers of persuasion to the utmost. Meddling relatives and friends are my worst enemies in this work, and, I am sorry to say, in some instances, medical men have been responsible for patients stopping the treatment. I have never yet found their reasons for doing so in any way justifiable. As far as my memory serves me, patients have always gone from bad to worse when this has happened. I have never seen any harm result from the treatment.

The fear of cantharides is very much overdone, in my opinion. I have never had a case of sepsis, and have never failed to heal the raw surfaces within a few days. Occasionally a savin rash of an urticarial nature develops, and there is nearly always some itching of the skin as the surface heals. For the relief of this, I find hæmamol or dielectric unguent most efficacious. In any case, it usually passes in a few days.

One of the most striking results of this form of treatment is the relief of pain. This has occurred in at least four out of five of my cases. Patients, whose pain has defied all remedies for years, are often relieved in a few weeks by these means, and the relief is very lasting. Another is restoration of sleep. I detailed other improvements in my former article, but I wish to emphasize these two.

MULTIPLE SUPERFICIAL ACU-PUNCTURE WITH COUNTER-IRRITANTS.

The instrument I use for this, contains 33 needles, set in a block of metal, to which a long coil spring is attached. This is set in a hollow tube, and there is a small handle at the other end of the spring which projects beyond the tube. These instruments were made in Germany, by Messrs. Bannscheidt, Endenich, Bonn, and are with difficulty obtainable now. By pulling on this handle when the instrument is in position, minute punctures may be made in the skin. These are immediately painted over with a mixture containing one drachm of croton oil and $\frac{1}{4}$ to $\frac{1}{2}$ gr. of cantharides to an ounce of almond oil. A fine rash soon forms, which generally becomes pustular within 48 hours. These pustules form in rings owing to the arrangement of the needles, and it is convenient to prescribe so many "rings" for each patient.

I pull and let go three times before removing the instrument, thus making 99 small punctures in each "ring." In a sensitive patient, I use a weaker preparation than the above, but never stronger, for blistering may occur, and that is not aimed at. This form of treatment, although not so powerful as the blister and savin, acts with extraordinary celerity in certain cases of neuritis, arthritis, etc., and has the advantage of requiring little after-attention. Patients, as a rule, may go about within reason, but should be very careful not to sit in a cold room or stand about outdoors in a cold wind, gardening, etc.

It is always well in every case to make a test treatment of a few "rings" on one leg to begin with, for some patients get a sharp general reaction after each application. Special care should be taken to proceed cautiously with asthmatic and paralytic patients, as well as with elderly and emaciated patients, no matter what the disease is. The amount of rash and pustules is in direct proportion to the toxic condition of the patient, and is, therefore, diagnostic as well as curative.

Another advantage is that it may be continued for an indefinite period without harm to the patient. In one case of disseminated sclerosis, I continued it for six years, the patient seldom being more than a month without a treatment. I am convinced it was instrumental in restoring the patient's general health and a very useful amount of muscular power, and maintaining it. He has now been over two years without a treatment, and is holding his own very well. He has suffered over 23 years from his malady, and was very helpless when I first took him in hand eight years ago.

The number of "rings" made at each sitting is arbitrary. When patients are well used to them, as many as 100 may be put on. They may be put close together or wide apart, according to the needs of each patient. They may be applied every three, four, five, six, seven, or more days. As a rule, the weekly interval is most convenient. It is well to allow one set of pustules to dry up before making another application. Judgement in such matters comes with experience. Success or failure depends largely on skilful use of the remedy, and frequent discussion between a novice and

an expert is of great value to the former.

THE GALVANO-CAUTERY.

This is, in my experience, the least powerful of the methods, but it is quickly done and convenient, no dressing whatever being necessary. It is used in the same kind of cases for which ionization is employed, and, in my opinion with equal if not greater success; it is much easier to use and less expensive. In mild cases of want of nerve tone, hypoaesthesia and neurasthenia, it acts like a charm if applied to the back on each side of the spinal cord. A large, strong cautery point is selected, and dots or dashes made according to the fancy of the operator. Six dots or 60 may be put on each time, but I rarely exceed 24. One may be made deeply or superficially; personally, I think the more lightly it is done the better the result.

One of my greatest difficulties is in getting cheerful, strong-minded, muscular nurses for my patients. Generally speaking, the nurses are as broken hearted as the patients.

ANTISEPTIC PRECAUTIONS, A FEW HINTS.

A small steel palette knife may be used for spreading ointments, and sterilized in a spirit flame.

Two per cent. formalin may be painted over ointment dressings.

A strip of lint may be stretched over the mouth of the acupuncture instrument and saturated with pure lysoform. This is non-odorous, does not rust needles, and does not irritate the skin. The skin should be sponged with rectified spirit before an application is made.

After an application has been made the part should be covered with sterilized lint or cotton wool fortified with gauze. This may be secured in position by adhesive strapping or pinned to underclothing. Other measures will no doubt be considered useful by individual practitioners.



Practical Notes.

AN ANTISEPTIC POWDER.

Duret has followed up his investigations into the action of the magnesium hypochlorites and other compounds formed by the interaction of chloride of lime and magnesium sulphate. The isotonic solution prepared from a mixture of these two bodies has proved to be thoroughly reliable in effects, and is in constant use by many surgeons. He has since tried to produce a powder having the hypochlorite of magnesium as its active agent. After experimenting with several of the magnesium compounds, he has found that carbonate of magnesia mixed with chloride of lime gives the best results. The mixture is inert whilst dry, but, when moistened with water, the hypochlorite of magnesia is formed. The mixture can be made in varying proportions from 1 of magnesium carbonate to 5 of bleaching powder up to 10. These are well powdered and mixed together, and the powder will be found useful for dusting over dirty wounds. When packed in sachets of gauze and moistened with water, an excellent, moist, antiseptic, temporary dressing is at once available for use. The powder can be mixed with vaseline, and forms an ointment which is most useful for disinfecting the skin.—(*Journ. des Praticiens*, March 17, 1917.)

TREATMENT OF "TRENCH FOOT."

After trying many different methods of treatment with varying results, Chalié has found that he has been consistently successful by varnishing the feet with paraffin containing novocain. The application is most simple and easy to make. A block of paraffin is melted by warming it in a casserole. About 200 cc. of the melted mass is poured into the foot-shaped metal vessel carried in all ambulances, and popularly known as the "*haricot*." As soon as the liquid is cool enough to allow a finger being held in it, the patient's foot is plunged into this paraffin bath, and, at the same time, 10 cc. of a 1 per cent. solution of novocain are added. The parts of the foot which are not immersed are painted over quickly with a large-sized brush. In a very short time, a white wax-like varnish is obtained which covers and adheres to the foot. It sets very quickly, and forms a shell over the foot from 1 to 2 mm. in thickness. The foot is then wrapped up in a gauze compress held in place by a loosely applied bandage. As a rule, the soothing effect is obtained at once, but the patient is completely relieved by the following day. A fresh application is made every three or four days until all pain has completely disappeared. The method is simple, quick, and cheap. The surplus paraffin can be used over again. Most patients very much prefer the varnish to the boric acid and camphor fomentations recommended.

Chalié has recently been using, in place of novocain, 1.25 g. of cocaine and 2.50 g. of menthol to 1,000 g. of paraffin. The analgesic effects of this mixture are still more pronounced than those

of novocain.—(*Le Progrès médical*, February 10, 1917.)

MENCIÈRE'S SOLUTION AS A DRESSING FOR WOUNDS.

Cheyron strongly advocates the use of this solution for dressing wounds in the front line. During the Somme operations, he applied it to all non-penetrating wounds of the head, chest, and belly, and for all wounds of the limbs. The solution has the following composition :—

Iodoform.					
Guaiacol.					
Eucalyptol.					
Balsam of Peru	-	-	of each	10 g.	
Alcohol	-	-	-	-	100 g.
Æther	-	-	-	-	1000 g.

The parts immediately around the wound are carefully cleaned with benzoline. The wound is then sprayed freely with the solution, using for the purpose a vaporizer giving a fairly strong jet. Sterilized gauze and absorbent wool are applied over the wound and kept in place with a bandage. If a compound fracture is present, the limb is placed in a provisional splint of aluminium or any other material at hand. In the case of the lower limbs, the injured limb is bound up as well to the sound one. In this way, the patient can be moved with much greater ease and comfort to himself. The method is quick in application, a few seconds' spraying sending the solution into all parts of the wound. There is the further great advantage that the wound is not touched by the fingers, which, under the circumstances in the firing line, cannot be free from septic materials. The quickness of application makes it possible to dress the wounded and have them evacuated from the dressing station in rapid succession.—(*Journ. de Méd. et de Chir. prat.*, February 20, 1917.)

IODIZED CHLOROFORM.

Chassevant pointed out, some ten years ago, the special antiseptic properties of a solution of iodine in chloroform. Since the outbreak of the war he has been using it with signal success for stopping suppuration in wounds and promoting their healing up. Iodine is a powerful antiseptic, but its solution in spirit, or with iodides are all irritating and limit its use. The solution in chloroform does not destroy the living cell. It can be applied on the skin or on the most delicate mucous membranes without causing any desquamation. When applied to tissues laid bare by traumatism, it promotes a simple serous exudation. Pus cells, degenerating cells, and microbes become impregnated with iodine, and are eliminated. The best solution to use is 1 g. of iodine in 30 of chloroform. This solution is not caustic, can be applied to highly-inflamed wounds without causing the least pain, but, in fact, soothes the smarting of wounds and burns.

Chautemesse uses this solution for treating boils and carbuncles. These are aborted if treated in the early stage. After suppuration has begun, the pus is let out, and the interior well swabbed out with the solution.—(*Journ. de Méd. et de Chir. prat.*, March 10, 1917.)

